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Teaching Writing with Play: A Study of Community-Based Science Education in a National Park

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TEACHING WRITING WITH PLAY: A STUDY OF COMMUNITY–BASED SCIENCE EDUCATION IN A NATIONAL PARK

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ABSTRACT

Teaching Writing with Play: A Study of Community-Based Science Education in a National Park is a rhetorical ethnography designed to bring the lessons of community-based science education and science communication practices to bear on the university writing classroom. I examined how park rangers use engaged, playful methods to educate people about scientific and technical issues that affect coastal communities. Through three years of ethnographic field research and collaborative writing with the National Park Service, I investigated evolving public outreach programs at Fire Island National Seashore (FIIS) in New York during a time when heightened public contention about science-based decision-making created an exigence for park staff to re-evaluate their science communication and training methods. I conducted interviews and observations of park interpretive programs and trainings, collected relevant digital and print texts, and analyzed data with theoretical lenses from writing pedagogy, rhetoric of science, community writing studies, and environmental communication. This inquiry revealed public interpretive programs favoring dialogic and embodied interaction over technocratic forms of science communication. I argue that, in the wake of catastrophic storms and other environmental disturbances, as policymakers, land managers, and citizens come to terms with the possibilities for and constraints on recovery and mitigation, efforts toward more engaged, context-driven forms of public science communication can contribute to and strengthen ecological and community resilience. This study has relevance for science and technical writing, community writing studies, public participation in science-based decision-making, and writing pedagogy.

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CHAPTER 1

Introduction:

A Rhetorically Situated Tale of Emergence

The critical tale of the emergence of a research project
is key to our notion that research is a rhetorically situated activity.
– Patricia Sullivan and James E. Porter

Ethos saturates the moment of inquiry, and this is a condition
that the natural sciences face differently and less conspicuously.
– Ralph Cintron

On Monday, October 29, 2012, classes at the University of Rhode Island (URI) were cancelled because Hurricane Sandy was rocking the northeast coast of the U.S. Many people in the northeast had never experienced a storm of Hurricane Sandy's magnitude. It delivered a record-setting storm surge along the heavily developed coastlines of New York and New Jersey and became the second costliest storm on record in the U.S. since 1900. In the U.S. alone, Hurricane Sandy exacted more than $50 billion in damages, displaced more than 23,000 people, and killed more than 150 people (Blake, Kimberlain, Berg, Cangialosi, & Beven, 2013, p. 15; U.S. Department of Homeland Security, 2013, pp. 1, 8).

My own neighborhood, located a good distance from the coast, was spared with the comparatively minor inconveniences of downed tree-limbs and power outages. I was in my second year as a doctoral student at URI at the time, serving as a graduate teaching assistant (TA). That semester, I was the instructor of record in a literature course, ENG 243: The Short Story. I remember staying home during Hurricane Sandy and making the most of an extra day off-campus to catch up on course readings and grading. Engrossed in my teaching and nearly overcome, daily, with anxiety about how to bring order to what seemed to me like an overwhelmingly complex, creatively demanding role as a teacher, I was more focused that day on what I would do in class on Friday, and then on Monday, and then on Wednesday, and then on Friday, than I was on the storm raging outside.

Four days later, first thing in the morning, I received an email from my professor, David Faflik. As a first-time teacher of a literature course, I was enrolled in David's TA training course. He wrote to ask if he could drop in and observe my class that afternoon. I welcomed him to visit my class, letting him know that it might be a little more hectic than usual—this would be the first time the class had convened that week since Hurricane Sandy. David visited, and the agenda that I had planned went over basically without a hitch. Later the same day, he wrote me a letter that began with a nod to Hurricane Sandy: "All signs indicate that not even a natural disaster is enough to prevent you from doing what you clearly do well – teach" (D. Faflik, personal communication, November 2, 2012).

The unflattering truth is that although Hurricane Sandy had caused so many people hardship, I had rather benefitted from a day at home sifting through things that

had fallen by the wayside during the first half of the semester, blowing through some readings for my graduate courses, and restoring order to some of the chaos of my drafted lesson plans for the coming weeks.

Still, the feedback that David provided proved transformative. In short, he challenged me to relinquish control. Some of the order, some of the rigid structure that I had imposed on the classroom experience could be dismantled, he said. He suggested creating "genuine opportunities for more spontaneous learning," and advised "[when you] plan every classroom moment down to the minute, you also run the risk of snuffing out more organic learning moments for your students." Finally, David wrote:

> I almost sense that you are afraid of letting yourself go a bit, and of allowing your students to do the same . . . But I wonder, as I say, if there might be a way to take a step or two in a more student-centered direction – to allow some moments of unbridled (and unplanned) edifying fun, even. . . . try to shake things up every now and then without shaking your foundations. (personal communication, November 2, 2012)

This letter sparked a four-year and still ongoing quest to transform my teaching. I pursued this quest throughout a semester's worth of training with David and my fellow graduate TAs, and with the support of other faculty members who mentored me and offered feedback about my teaching over the years. Eventually, this quest would come full-circle when I turned my attention back to the storm-wrought transformations across coastal communities that had been hard-hit by Hurricane Sandy. But, at the time, in the days after the storm, I had no notion of how

significantly Hurricane Sandy, post-storm conditions, storm mitigation and recovery would figure in my research over the coming years.

Under these circumstances, I originally envisioned this dissertation research from an orientation firmly grounded in writing pedagogy, as a study that would inform, primarily, pedagogical theory and practice in the teaching of writing. I started articulating my vision for this research through a review of the scholarly literature on pedagogies of play, which I intended to use as a theoretical framing concept for exploring how teachers of writing in the university could make something pedagogically meaningful of exploratory, unpredictable, improvisational, risky, and somewhat open-ended activities, writing experiments, and practices. I was curious about what it would mean to envision the university writing classroom as a more studio-like space where students could accept more autonomy and engage in a highly collaborative writing environment that would be kairotic, connected with, and responsive to community-based, public issues that warranted immediate attention and social action.

Particularly relevant to my experiences as a teacher—and to the feedback that I had received about my teaching—were the ways in which pedagogies of play could make it possible for students to engage in generative, consequential learning and writing not in spite of, but in light of the teacher relinquishing some control. In practice, play can enhance students' rhetorical awareness by enabling flexibility and choice. By eschewing tightly orchestrated activities in favor of offering flexibility and choice, students can reflectively shape their own learning experiences, consider unexpected critical, creative, and rhetorical possibilities, and test ideas (Colby &

Colby, 2008; Shipka, 2006; Shipka, 2011, pp. 83–109). In order to support a student's autonomy, play places a high premium on the affordances of improvisation, open-ended exploration, and self-directed discovery (Boquet, 2002, pp. 68–76; Colby & Colby, 2008, pp. 305–310; Rouzie, 2000; Wysocki, 2004, pp. 13–22).

In the years that followed, as I continued to teach at URI—literature courses, first-year writing courses, and an upper-level public writing course for writing and rhetoric majors—I studied the existing scholarship that related directly and indirectly to pedagogies of play, experimented, reflected, and shared my ideas with colleagues and with my students, all with the intention of learning what play might mean for teaching and learning in the writing classroom. I was interested in what play might mean for the kinds of courses that I was already teaching, courses that integrated collaborative writing across a wide variety of contexts, including community-engaged and public writing contexts, to which I brought more than ten years of experience as a professional writer for media, nonprofit, and local environmental conservation organizations.

This blend of commitments—to pedagogical praxis and scholarship, to the practice of community-based writing, to the embedded experiences so crucial to writing in community-engaged contexts, and to rhetorical studies—prepared me well for the opportunity to write and to conduct research in a National Park site. For, while I pursued my interest in pedagogies of play, coastal communities not so far from my own neighborhood were still reeling, years later, from the impacts of the natural disaster that was Hurricane Sandy. In the fall of 2014, an unexpected opportunity to write with and for the National Park Service about post-Hurricane Sandy storm

mitigation efforts became a reality and brought to light a situated exigence for a community-based orientation toward my inquiry into pedagogies of play.

The scholarly literature on play demonstrates that play can mean and do different things in different contexts. Besides taking stock of the breadth of scholarship in the field that is relevant to pedagogies of play, my research into what can play mean and do in writing classrooms benefits from engagement in a field site to examine how play is used—what it means and what it does—in a community-based setting outside of the university. Rhetoric and composition scholarship that discusses play has not yet established practical or theoretical connections between teaching with play and community writing. This research offers contextual understandings of teaching with play that emerge beyond university classrooms and which can potentially cast new light on rhetorical scholarship, writing studies theory, and the practices of teachers of writing.

Scholarship in community writing has long since established justifications for and has asserted the urgency for direct engagement between scholars of writing and rhetoric and communities outside of the university in order to "unite" and advance the research, service, and teaching missions of the academy (Cushman, 1999, p. 331). The benefits of engaging in direct participation with communities toward social change flow to both the communities themselves and to academic scholarship and teaching practice, as engagement with communities outside the university can "inform our teaching and theories with the perspectives of people outside the university" (Cushman, 1996, p. 22). Professional communication scholarship that espouses a critical action research methodology further asserts that community-engaged action

research "is contextual, local, and requires intervention, not simply description," and that that the aim of such research is "to produce knowledge that benefits some nonscholarly community" (Blythe, Grabill, & Riley, 2008, p. 273). This research is not properly action research. It is intended to inform writing studies scholarship and teaching. However, as a researcher involved in a community-engaged field study, I have taken cues from the ethics and methods of critical research practices. From the early stages of designing this research, I attempted to steer toward the opportunities that being there in the field and conducting research outside of the university afforded to discover the potentials and risks associated with theories and practices of play in community-based contexts, to adapt my research to the needs of participants, and to intervene in ethical and fitting ways where possible.

Writing Resilience after Hurricane Sandy

In May of 2013, about six months after Hurricane Sandy, the U.S. Department of the Interior (DOI) allocated $787 million in disaster relief funds to post-storm recovery and mitigation projects delivered through its constituent agencies, which include the National Park Service (NPS), U.S. Fish and Wildlife, and the U.S. Geological Survey. Among these projects were dozens of scientific studies of coastal natural resources in public lands. These post-Sandy studies were designed, in part, to illuminate opportunities to "make communities stronger and more resilient" in the face of future storms and climate change impacts (U.S. Department of the Interior [DOI], 2013, para. 2).

The degree of water-level rise, the quantity of damages amassed and dollars invested, and the number of lives lost: these figures are often called upon to evoke, pithily, the scope of this catastrophe. But the numbers fail to capture some of the diverse understandings of Hurricane Sandy's impacts. They tend, for instance, to oversimplify the emerging knowledge that biologists, ecologists, geographers, coastal geomorphologists, oceanographers, and other experts bring to bear on understandings of the storm and its impacts. They do not illuminate the complexities of deliberations between policymakers, publics, and other stakeholders over recovery and mitigation efforts coordinated on behalf of the states, cities, towns, and local communities impacted by Sandy. And they omit the accounts of individuals who dwell, work, play, and own (or lost) property in places affected by the storm.

In the years since Hurricane Sandy, decisions about the management of coastal natural resources have fueled public debate in communities across the northeast. Meanwhile, the ongoing DOI-funded mitigation projects and post-storm resilience studies that are designed to inform pending management decisions promise to stimulate public deliberation for years to come. In this context, knowledge about how diverse publics are making sense of storm impacts and storm mitigation investments is indispensable to those who study and manage public natural resources. With such an understanding, resource managers, scientists, and science communicators who are accountable to the public can discover how better to engage with and educate people about science-based issues that will impact natural, structural, and cultural public assets.

Beginning in the fall of 2014, I joined the post-Hurricane Sandy resilience efforts as a graduate research assistant in the Society, Ecology & Communication Laboratory (SEAcomm), directed by Dr. Caroline Gottschalk Druschke at URI. In this role, I was charged with writing public outreach materials related to scientific studies in coastal National Park sites. My position in SEAcomm was part of a cooperative agreement with NPS and funded through DOI as part the suite of post-Hurricane Sandy resilience studies.

As a writer of researcher profiles, photo stories, and resource briefs for NPS, my primary responsibility was to introduce policymakers, park interpretive staff, and diverse public audiences to the post-Hurricane Sandy resilience studies funded through the Disaster Relief Appropriations Act of 2013. My writing focused on scientific research in ecology, marine biology, oceanography, coastal geomorphology, and more, that examined how natural resources changed as a result of Hurricane Sandy. Some of these studies modeled how coastal resources might fare in light of future storms, sea level rise, and climate change impacts. In the context of this NPS writing, it also became my job to introduce definitions, examples, and even productive questions that could help my audiences sort out what resilience might mean to them, their communities, and the coastal places that they value.

It cannot be overstated how centrally the concept of resilience figured in the suite of post-Hurricane Sandy research studies. Resilience provided the impetus and the political will for disaster legislation and federal outlays following Hurricane Sandy. Ostensibly, each study funded through post-Hurricane Sandy DOI grants and

cooperative agreements addressed, either directly or indirectly, questions about the resilience of coastal ecosystems and the resilience of coastal communities.

The term "resilience" can be traced to the Disaster Relief Appropriations Act (2014), which, on January 29, 2013, established the initial provisions for DOI to spend a preliminary $360 million on Hurricane Sandy recovery and mitigation projects, and specified criteria indicating that those projects should "increase the resiliency and capacity of coastal habitat and infrastructure to withstand storms and reduce the amount of damage caused by such storms" (Disaster Relief Appropriations Act of 2013, p. 30).

Even earlier, within less than six weeks of the storm, on December 5, 2012, the Senate Subcommittee on Homeland Security convened a special hearing on Hurricane Sandy response and recovery, which invoked the urgency for enhancing coastal resiliency. In her opening statement, subcommittee chair Senator Mary L. Landrieu of Louisiana warned, "Rising sea levels, more active hurricane seasons, increased development along our Nation's coasts clearly reveal that Hurricanes Irene and Sandy were not one-off anomalous events, but rather part, unfortunately, of a continuing and troubling trend," which warrant "preparedness and mitigation efforts" that can "improve the resiliency of our communities, environment, essential services, and vulnerable populations" (S. HRG. 112–861: Hurricane Sandy, 2012, pp. 3–4, 11). "Resilience" was invoked by several others during the hearing. In fact, so much consensus accrued around the term that, after ten senators had already delivered statements and Senator Ben Cardin of Maryland took his turn to speak, he said "I want to just join the choir here in saying we've got to invest in resiliency" (p. 35). In the

context of this hearing, the concept of resilience began to sound like the only long-term salvation for coastal communities struggling to adapt to an environment that is increasingly fraught with sea level rise and other climate change impacts, including more intense and more frequent storm events along heavily developed coasts.

My research, grounded in writing studies and rhetoric, ultimately blended my inquiry into pedagogies of play with the science education and science communication practices of park staff in this context in which the resilience of coastal communities, the launch of scientific projects to learn about coastal resilience, and the communication of the value of resilience research were elevated as a driving concern for park interpretation at Fire Island National Seashore and several other federal holdings on the northeast coast. Ultimately, I framed this research as a study of how park rangers used engaged, playful methods to educate people about scientific and technical issues that affect coastal communities.

Play in the Field

Guided by an ethic of emergent research methodology, my engagement in a field site outside of the university shaped the direction of my research into teaching with play. Porter and Sullivan (1997) write,

> When we are operating in scholarly mode, we don't just wander, we wander with purpose. . . . the foci of our studies emerge over time and as a result of critical engagement with participants and events, rather than as responses to preset questions we have derived from theory and then must test empirically.

> These foci are constructed heuristically out of the interplay of tensions that drive and obstruct the process of investigation. (p. 164)

The unique role that I had as a writer for the National Park Service enabled me to work in a partnership with a government agency, and provided me with access to conduct embedded community writing research within a traditionally exclusive site. This role offered an opportunity for developing ethnographic research that could have implications for teachers of writing, pedagogical scholarship, community writing scholarship, environmental communication, as well as for the people I collaborated with in NPS, and for the audiences that they were asking me to address in the public outreach materials that I produced with SEAcomm. As a result, this study has potential to inform NPS practices that shape and constrain public participation in science-based decision-making.

Community-based fieldwork with government partners can also be heavily constrained by policy and bureaucratic barriers, challenges in articulating and accommodating the needs, values, and interests of diverse and, in some cases, historically marginalized audiences, and the divergent disciplinary and professional conventions and protocols of collaborators such as subject matter experts, scientists, natural resource managers, and public information officers. What I wanted to learn about seemed to align with transformations occurring in NPS public information practices and park interpretation, however, as Sullivan and Porter (1997) assert, "the interplay of tensions that drive and obstruct the process of investigation" to some degree take precedence over and call for a flexible, emergent orientation toward the "preset questions" that ethnographic researchers imagine when they begin (p. 164). I

attempted to adapt my research toward participants needs, toward the conditions and exigencies that I encountered in the field site, and toward emergent public writing, science and technical writing, and professional writing issues that mattered to research participants and their audiences.

Over the course of three years of research and collaborative writing with NPS, the scholarly literature that originally informed this dissertation study gradually toggled in and out of focus, from the center to the periphery and back again, as my engagement in the field site brought to light the relevance, too, of scholarship and theoretical lenses dealing with environmental communication, rhetorical ecologies, public understanding of science, participatory rhetorics in science communication, and more. In the chapters that follow, I elaborate on these different strands of scholarship in writing and rhetoric, using them as frames for discussions of community-based science education and park interpretation in the field site. Throughout most parts of this text, play is woven through, sometimes in ways that belie its centrality to the study and its role as the concept that motivated this research. However, play remains meaningful for the theoretical implications and practical methods that it suggests for rhetorically situated activities that call for meaningful, generative engagement. To correct what I perceive as an imbalance in later chapters, I offer here an overview of the literature on pedagogies of play, as it shaped this study.

Play in Writing Studies

Play has currency in many different academic disciplines, not to mention various institutions and industries. In writing studies, it has gained value of late as a

pedagogical concept, as an emerging strategy for invention, and as a catalyst for production. Discussions of play in the field of writing studies stretch the concept broadly, from game studies to writing center theory to multimodal composition, material rhetorics, and the technologies of writing.

Discussions of play can be found in writing studies scholarship on the integration of video games in the writing classroom. The dominance of video games and online games in the self-sponsored writing of students outside of the classroom recommend them to writing instructors (Alexander, 2009; Colby & Colby, 2008; Sabatino, 2014; Yancey, 2004). Discussions of game play in the teaching of writing focus on the affordances of games as primary texts that "build bridges" toward multiple literacies relevant to writing in academic contexts, and on the uses of games for contextualizing student writing rhetorically, for providing student writers "access" to authentic audiences, exigencies, delivery and circulation (Alexander, 2009; Sabatino, 2014, p. 42; Colby & Colby, 2008, pp. 301, 309, 310).

Writing center scholars, too, have drawn on play as a strategy for shaping the experience of tutoring sessions and for shaping identity (Boquet, 2002; Dvorak & Bruce, 2008). While these discussions of play for writing center practice may offer significant insights into the possibilities for play in writing instruction, it is also important to recognize the limits of writing center theory for classroom instruction. The roles, identities, relationships, practices, interactions, spaces, conflicts, and problems relevant to writing centers do not necessarily, and do not typically, have a counterpart in writing instruction and classroom spaces, as several of the essays in Dvorak and Bruce's (2008) volume point out.

Nevertheless, while Boquet's (2002) purpose is to suggest practices for writing center administrators and tutor-training, her work does have significant implications for the writing classroom and pedagogies of play. Invoking musical metaphors and analogies, Boquet (2002) speaks of play as risky and generative improvisation, and she defines disruptive noise as a valuable by-product of collaborative play (pp. 69, 75, 76). For Boquet (2002), play is something that we should do in writing, in collaboration or peer review, in pedagogy, as teachers, as writers, as tutors, and as students. She writes,

> The real skill lies in figuring out what to make of . . . mistakes. I don't want tutors to choose the safe route rather than (maybe) the exceptional one. I want them to at least *try* to exceed the mean expectations that they hold for themselves (and that perhaps others hold for them), even if such attempts result in their occasionally falling below those expectations. (Boquet, 2002, p. 81)

Of all the conversations in writing studies around play, discussions of writing process are arguably the most accessible, familiar, and broadly applicable. Most discussions of the affordances of play for writing process acknowledge Peter Elbow's contributions, including invention strategies such as the believing game and the doubting game, looping, and "metaphorical questions" (Elbow, 1973; Boquet, 2002; Rouzie, 2000). But play as a strategy for invention in composition studies did not have its origin in either the process movement of the eighties or in the expressivism of the seventies. Susan Jarratt (1991) traces play as an intellectual, rhetorical, discursive, political practice to the sophists and to the very origins of rhetoric, in the fifth century B.C. She discusses the historical and political contexts that created an exigence for

play, and examines the affordances of play, in its implications for techne, invention, style, arrangement, and pedagogy, in contemporary contexts, specifically in the context of feminist discourse and historiography as well as critical pedagogy.

Jarratt (1991) reveals how the sophists were playful inventors interested in complexity and discovery, averse to fixing on a single version of reality. Play was instrumental in opening a discursive means for realizing complexity, discovering new meanings, and challenging conventional meanings and interpretations assigned to influential texts. Jarratt (1991) credits the sophists with conceiving of and "formaliz[ing]" an alternative set of strategies for composing discourse (Jarratt, 1991, p. 63). Techne became the sophists' means for challenging absolutism (Jarratt, 1991, p. 27). Relying on experimentation with unconventional styles and arrangements, particularly antithesis and parataxis, the sophists emphasized complexity and narrative over simplification and "the propositional equation" and in doing so, they playfully challenged the dominance of logos in Athenian culture (Jarratt, 1991, pp. 19, 27, 22–23). Though sophistic rhetoric has been dismissed since Plato as "a spurious trick for clouding the minds of the listeners," Jarratt (1991) demonstrates that it "rather works to awaken in [the minds of listeners] an awareness of the multiplicity of possible truths" (p. 22). Jarratt (1991) describes sophistic techne as instrumental in "tragic critique" and "'comic' reconstruction" (pp. 27, 21). The "'comic' reconstruction" of alternative, probable meanings is, says Jarratt (1991), "a human invention. The story-teller plays with the material like Frankenstein with body parts" (p. 28).

Studies in writing and rhetoric have long reflected an interest in examining "the multiplicity of possible truths." The expressivist and process movements in

composition studies in the latter half of the twentieth century tended to elevate the rhetorical canon of invention, privileging recursivity for the sake of discovery. Similar impulses have compelled scholars in writing studies to consider play for its affordances in the production of multimodal texts. Fulwiler and Middleton (2012), for example, write about how multimodal composition presents unique challenges that warrant a reconsideration of writing process. When students puzzle together print alphabetic text, still images, animation, video recordings, and sound, each discrete modality brings to light new meanings, new interpretations of consequence, for the writer to consider. Fulwiler and Middleton (2012) discern, in the new meanings that emerge from the multimodal composing process, an exigence for play. Because students may be tempted to evade surprises that threaten to alter their original plans for their writing or that complicate their vision of a final product, Fulwiler and Middleton (2012) recommend a more recursive writing process, one that is friendly to the "cognitive wrestling" that multimodal composition affords. The analogy of wrestling suggests a playful element for multimodal writing process, and indeed this is deliberate.

Like Fulwiler and Middleton (2012), Shipka (2006) aims to disengage students from writing processes that encourage evasion. She argues that one of the affordances of play is the demand it places on student writers to become "flexible" in their encounters with surprises (Shipka, 2006, p. 359). Play requires reflection on multiple rhetorical strategies, including genres, modes, materials, and methods that are unconventional, and analyzing "alternate goal structures" (Shipka, 2006, p. 359). Play, Shipka (2006) says, enables writers to make thoughtful, deliberate, and rhetorically

sound choices not in spite of surprises, but in light of them (pp. 364, 365). Together, Shipka and Fulwiler and Middleton seem to argue that goals and plans for writing are made to be re-imagined (Fulwiler & Middleton, 2012, pp. 42, 46, 48; Shipka, 2006, p. 359).

Interestingly, different definitions of play may be epistemologically inconsistent, or even opposed. Discussion of "cognitive wrestling," for instance, and a recurring interest in writing process and goal structures echo cognitivist models of writing process. Drawing from Csikszentmihalyi, Shipka (2006) asserts that play produces knowledge because it leads to the "'discovery that we can create various realities by alternating between different goal structures'" (p. 355). The epistemological underpinnings of play that Shipka suggests seem to align with Fulwiler and Middleton's (2012) articulation of the consequences of "cognitive wrestling" and "new recursivity." Fulwiler and Middleton (2012) write,

> When composers use multiple modes *as tools for thinking* rather than just to visually illustrate a completed script, they actually generate new meaning. . . . In the same way that writing generates new thought rather than merely transcribes existing ideas, so too can the modalities of image and sound. (p. 44)

In addition, Fulwiler and Middleton (2012) assert that "new recursivity" is more than just process; it is also, they say, a "critical cognitive experienc[e]" (p. 44). In other words, knowledge is produced in the mind of the individual writer, through that writer's engagement with different modes, and through that writer's active discovery and restructuring of goals. Those who define play in terms of a cognitivist-type model of writing process have formulated a definition of play that competes with others who,

for instance, define play in terms of its affordances for collaborative learning, collaborative writing, or for engaging students with "real-life" audiences, exigencies, delivery, and circulation beyond the scope of the classroom (Elbow, 1973; Boquet, 2002; Colby & Colby, 2008).

Wysocki (2004) responds to the multiplication and amplification of modalities and media tied to digital composition, electronic publishing, and digital literacies by urging teachers of composition to be alert to, and to ask their students to be alert to, the values and ways of thinking that distinct writing technologies and materials reproduce. Specific kinds of knowledge and meaning emerge from work with specific technologies and materials, she says, and left unobserved, writers become subject to them, rather than the medium being subject to the writers' purposes. To Wysocki (2004), play means experimenting with "a wide and alertly chosen range of materials" and technologies, whether new, old, unconventional, or not. This sort of play, she says, affords writers the potential for agency that is otherwise denied writers who assume that the materials and technologies they employ are neutral. Wysocki (2004) writes, "agency comes precisely in being alert to the 'social forms' . . . in which we move, in understanding where and how we and our practices fit, and hence where and how we have room and opportunity to make change" (p. 13). And later, she adds,

> This opening to change requires experimentation and patience with what might seem strange since it means calling attention to what previously functioned quietly, invisibly. This opening might give us more room for play because it gives us perspective for seeing and working alertly with a wider range of the material potentials of our texts. (Wysocki, 2004, p. 15)

In calling for a closer examination of the ideological and epistemological qualities of writing technologies and materials, Wysocki (2004) also calls upon theories of crafting to make her case. In doing so, she has contributed her concerns with materiality and agency to a discussion that is even now gaining momentum in the field of rhetoric and composition. Wysocki (2004) says that crafting "work[s] against the standardization of our industrial corporatized world," and she adds, "Such crafting requires one to gain expertise, but—more importantly for me—the notion of craft contains a particular sense of relationships among the maker of an object, the thing made, the users of the object, and the social context in which the object is made" (p. 21). Wysocki's (2004) work seems to anticipate significant, but as yet under-examined, links between emerging discussions of crafting, pedagogies of play, and rhetorical ecologies.

The scholars who have contributed the most salient scholarship and theories that may inform pedagogies of play are not always in agreement about what grounded practices constitute play in the writing classroom. Colby and Colby (2008) propose a framework that transcends the game studies niche, even as it draws upon concepts from game studies: progressive and emergent. One type of pedagogy of play, which they call emergent, produces or enhances the possibility for students to respond to rhetorical situations of consequence in kairotic ways. The other, called progressive, is ruled by arbitrary, limited, and artificial exigencies prescribed by the instructor. Progressive pedagogy herds creative and rhetorical activities into a relatively fixed, linear, and time-limited process from the beginning of the semester to the end of the

semester. Colby and Colby (2008) argue that such a pedagogy obstructs students from taking responsibility for their learning, blocks them from engaging with the full complexity of invention, and limits their ability to create kairotic responses to exigencies in the communities to which they claim membership. It demands that students foreclose swiftly, they say, and most importantly, a progressive pedagogy all but eliminates genuine choice and autonomy for students. Progressive pedagogy may indeed enable generative recursive moves through assigned journaling, reflective writing assignments, drafting, peer review, and revising. Nevertheless, those stages of the writing process are still rigidly defined and prescribed.

An emergent pedagogy of play, on the other hand, allows student writers to engage multiple "layers of invention [that] open up possibilities of discovery rather than limit inquiry to one instructor's expectation" (Colby & Colby, 2008, p. 310). Emergent pedagogy assumes that there are "many avenues" for responding to any given rhetorical situation and enables students to discover, invent, explore, and consider some of these many avenues, perhaps even some that the teacher would not have conceived of had s/he devised a progressive pedagogy to shape class work and students' production of texts. "With an emergent pedagogy," Colby and Colby (2008) write, "teachers introduce writing principles and strategies in order to open up a studio-like space for students to work through those strategies on their own" (p. 305). In fact, with emergent pedagogy, it is not just the teacher's expectations that are viewed as limiting. The planning of the student writer has the potential to curtail emergence, as well. Even when students write their own learning contract, their plans tend to "defeat a truly emergent pedagogy [because] organic and exigent writing tasks

. . . can be ignored because they are not part of a student's plan" (p. 309). The impulse to sustain the principles of emergent pedagogies of play in writing classrooms is strong for Colby and Colby (2008), because, they argue, emergent pedagogies of play support students' discovery of and attention to exigencies outside of the classroom, and enable students to engage in meaningful public writing, social action, and writing of consequence.

Contributing to discussions of play in computers and composition, Rouzie (2000) offers a historically-grounded examination of the work-play dichotomy and endorses a productive "serio-ludic" play for the writing classroom. He acknowledges the potential for the self-sponsored writing of students to contribute to their learning (Yancey, 2004), and in this vein, Rouzie (2000) claims that teachers are "blind[ed] . . . to the significance of the play that is already ocurring in their classrooms, preventing them from addressing it as a productive force for change and learning" (p. 629). The borrowed concept of "underlife" affords Rouzie (2000) a frame for giving critical attention to the humor and playful banter that emerge in online class forums, which he argues have consequences for negotiating authority, agency, and empowerment.

Rouzie's (2000) dominant assertion is that play does rhetorical work, and in many respects, his notion of play aligns with Jarratt's (1991) representation of sophistic rhetoric. He writes, "Play's rhetorical power lies in part in how it can affect our most serious activities, but with a parodic twist, as in a funhouse mirror" (p. 633). Sophistic *techne*, as described by Jarratt (1991), which elevated style, narrative, arrangement, and antithesis, and sought in kairotic ways to challenge logos by suggesting the plausibility of alternate ways of understanding history and myth, is

indeed both serious and playful, rhetorical and twisted, ethical and sporting. Jarratt's (1991) work also carves out a third space in the work-play dichotomy where, as Rouzie (2000) says, "play can be serious, work can be playful" (p. 633). The serio-ludic may be said to correspond to the serious political and ethical purposes of sophistic rhetoric along with the playful style and arrangement that made critique of popular culture and change possible (Jarratt, 1991, p. 104).

Ultimately, both Colby and Colby (2008) and Rouzie (2000) suggest that pedagogies of play are potentially empowering for students—"a powerful force for resistance and change," according to Rouzie (2000), and, for Colby and Colby (2008), effective for de-centering the classroom and for offering more autonomy and choice, since students become responsive to "real" rhetorical situations rather than to an assignment sequences (Rouzie, 2000, p. 629; Colby & Colby, 2008, p. 310). Similarly, Jarratt (1991) demonstrates how sophistic rhetoric finds its contemporary counterpart in critical pedagogy, both in the critical (serious) move toward empowerment—bringing students "awareness of the way culture, structuring thought and action, contains contradictory messages, some of which do not serve the best interests of those members who hold them"—and, simultaneously, in the playful "impulse toward creating alternative worlds . . . [as] in the playful and future-directed 'technologies' of sophistic rhetoric" (pp. 107, 110, 112). These emphases on play in pedagogy and rhetoric, toward social change and empowerment suggest an obvious link between Colby and Colby's (2008), Rouzie's (2000), and Jarratt's (1991) scholarship. However, I would add that a closer examination of emergent pedagogy, serio-ludic

play, sophistic rhetoric and pedagogy, and critical pedagogy would likely reveal important distinctions, as well.

Like Jarratt (1991) and Rouzie (2000), Boquet (2002) asserts that play has implications for social change. Boquet's (2002) theories also illuminate entrenched institutional biases that represent barriers to play. She advises dwelling in noise and chaos, things typically deemed inefficient or digressive, insisting that noise constitutes "genuine information," that "order develops *out of* chaos, not through the elimination of it," and she writes that, "Ironically, it is the noise, not the official information, that allows for the mutation and potential reorganization of the system" (p. 51). Not all, but many familiar manifestations of invention exercises used in the composition classroom are crafted and designed to be time-limited prompts for producing relatively predictable responses—the kinds of responses that fit neatly with, say, the scaffolding of an assignment design and tight deadlines, and that would align with Colby and Colby's (2008) definition of progressive pedagogy. Play, on the other hand, like noise, according to Boquet (2002), is likely to be regarded as inefficient, digressive, or threatening because it is not nearly as predictable and does not neatly lead to a pre-defined product.

In light of the intellectual and practical demands of play, John Dewey's observations in 1933 are as relevant as ever: "monotony and uniformity" in traditional classroom practices are detrimental to learning, while "spontaneity" tends to be excluded by the relatively controlled and orderly conditions of classrooms (Dewey, 1933/2008, pp. 154–155). And yet, he writes, "[M]ost enterprises in school are of too short a span to allow for that unfolding and leading of one thing into another without

which good habits of reflection cannot be developed" (Dewey, 1933/2008, p. 155). Boquet (2002) boldly elevates noise above efficiency, in a succinct argument that, notably, echoes Dewey. "Efficiency is a bad model for the growth and development of the human mind," she writes (pp. 51, 52). Instead, for the sake of invention, discovery, and transformation, she favors enabling student writers, "experiences [that] fly in the face of efficiency" (p. 52). But Boquet (2002) acknowledges that her preferences buck deep institutional, and certainly cultural, assumptions about productive writing and teaching.

As composition teachers increasingly adopt play as a dimension of their teaching, it is worth noting that no pedagogy is neutral (Berlin, 1987; Holt, 1993; Colby & Colby, 2008; Wysocki, 2004). Some scholars have suggested that the meaning (and sometimes the stigma) of play is contingent and related to class difference, as well as to specific historical moments and changes in academe (Berlin, 1987; Rouzie, 2000; Colby & Colby, 2008, pp. 302, 303). Scholarship in game studies, computers and composition, and rhetoric and composition demonstrates that teachers in higher education have discovered a role for play in their classrooms, and that play is increasingly regarded in academic circles as consequential in terms of its cultural, social, economic, and, indeed, pedagogical implications.

Onward

The epigraph that opens this chapter is particularly notable for its hedges: "Ethos saturates the moment of inquiry, and this is a condition that the natural sciences face differently and less conspicuously" (Cintron, 1997, p. 4). The natural sciences are

rhetorically situated, only *differently* and *less conspicuously* than ethnographies. Those hedges break down somewhat in the spaces between natural science and public inquiry, where community-based science education and science communication occur, where interpretive park rangers dwell.

In conducting this study, I brought to the field site a motivation to learn more about what play can mean and do in the contexts of university and community-based writing and teaching. My positioning in the field site enabled me to drill down more deeply than I had anticipated on issues in science writing. I observed and participated in efforts to connect scientists with diverse public audiences, to translate the findings of scientific research for non-expert audiences, to interact with park visitors and draw out their knowledge and perspectives about controversial scientific issues in the park. I observed how park interpretive rangers are putting a new face on park science. In that discursive space, the "weave of logos and ethos" is evident, as it is in the ethnographic accounts and analyses that I present here (Cintron, 1997, p. 3).

In chapter 2, "Disturbance and Resilience: The Grounds for Dynamic Engagement," I blend rhetoric, pedagogy, and ecological science as part of an analysis of how ecological disturbance and resilience figure in park interpretation at Fire Island National Seashore and, more broadly, in science writing and science communication related to post-Hurricane Sandy storm mitigation research. In doing so, I theorize concepts from ecological science for rhetoric and connect the rhetorics of public engagement in situated contexts with community and ecological resilience. I argue that, in the wake of catastrophic storms and other environmental disturbances, as policymakers, land managers, and citizens come to terms with the possibilities for and

constraints on recovery and mitigation, efforts toward more engaged, playful, context-driven, participatory forms of public science communication can contribute to and strengthen ecological and community resilience.

Building outward from an earlier publication, I mobilize the concept of disturbance to show how it transcends ecology, human attunement to natural systems, environmental communication, participatory rhetoric, and writing pedagogy (Remillard, 2016). Opening with a glimpse of the role of disturbance in a writing process, I assert that disturbances can be powerfully generative, even when it produces unpredictable outcomes, temporary chaos, or crisis. An analysis of contested understandings of ecological disturbance, dynamic equilibrium, and resilience, as understood through the documents that shape resource management and park science, suggests implications for science communication, rhetorics of public engagement, and science-based decision-making. I propose that disturbance figures as an ecological and rhetorical opportunity to experiment, to discover ways of *going with* changing and sometimes unpredictable, unknowable conditions; it provokes tactical responses that make something of change and crisis.

Drawing upon the interviews and observations that I conducted with park staff, I demonstrate how the evolving science communication practices and interpretive methods at Fire Island National Seashore are oriented toward dialogic and embodied interaction and are characterized by collaborative inquiry. NPS scientists, park managers, and staff are exploring new ways to engage diverse publics and stakeholders in developing shared understandings of the complex consequences of ecological disturbance, natural disasters, and climate change, and in learning what

resilience can mean for their coastal communities. Their evolving playful science communication and public engagement strategies position park visitors as stewards of coastal natural resources and establish a means for experts and officials who study and manage public natural resources to learn how diverse publics are making sense of storm impacts and storm mitigation investments. I show how, in this context, playful, engaged interpretive activities take on the serious role of communicating scientific knowledge that is necessary for informed decision-making while still honoring local, social, cultural, and political knowledges that might otherwise be marginalized through science communication methods that are faithful to a deficit model.

Chapter 3, "Movement and Migration: Rhetorical Ecologies, Natural Ecologies, and Situated Knowledges in Public Science Communication," builds upon the analysis of science communication practices and interpretive methods at Fire Island National Seashore. I discuss how people attune to the complex natural ecologies of a post-Hurricane Sandy Fire Island within the context of complex material changes not easily reconciled with the language that circulates through public discourse about park science and park management. I place discursive action within the context of material and ecological transformations that mobilize and shape discourse. An analysis of policy documents and technical reports that shape the landscape of Fire Island, influence how park staff communicate about natural resource management, and affect the relationships between scientists, park managers, and public audiences demonstrates how the materiality of shoreline dynamics are embedded within the rhetorical ecologies of resource management, science communication, and public deliberation.

I assert that a technocratic model of science communication is not up to the task of confronting and negotiating productively the complex and dynamic rhetorical ecologies of science-based decision-making in public lands. Rhetorical or contextual models of science communication, on the other hand, enable dynamic engagement with diverse public audiences. Engaged, dialogic science communication has the capacity to acknowledge and stimulate responsiveness to the material enmeshments of humans with changing natural systems and "the complex interrelations between scientific data, cultural and local knowledge, social and ethical issues, and other forms of data needed to make policy" (Endres, 2009, p. 67).

I show how, through efforts to transform interpretation, park interpretive rangers at Fire Island National Seashore (FIIS) are engaging with the tensions at play among counter-perspectives on what a barrier island is and how it is valued. As a defining characteristic of their profession, interpretive rangers are called upon to acquire knowledge across social worlds so that they can provide meaningful translations of science that are consequential in the management and stewardship of natural resources. I argue that engaged, participatory methods of interpretation, the kind that park staff are currently developing and testing, have the potential to disrupt technocratic models of science communication and to engage diverse forms of expertise.

My work as a researcher, rhetorician, and writer converges with turbulent natural, ecological, physical, social, and symbolic disturbances unfolding in a public space. In Chapter 4, "An Impossibly Tight Weave: Evolving Ethnographic Methods for Rhetorical Field Studies," I discuss the productive tensions that

shaped my research, and I connect the issues that I contended with in the field site with ongoing methodological conversations concerning rhetorical field studies, autoethnography, and post-critical scholarship in rhetoric and composition. Rather than offer tidy resolutions, I reflect on the affordances of emergent methods, of dynamic participant-observer roles, and of mutivocality, while also detailing the methodological tensions that put strain on ethical, critical research practice.

For example, I discuss how research participants elaborated and refined their understandings of the concept that defined my research. Though the term in question was far from an in situ term, it became one through the course of my field work as participants considered, challenged, wrestled with, and reworked an understanding of play that I had proposed. As a result, they formulated multiple new possible understandings of play that made sense in the context of their knowledge, experience, and values.

Also, during this study, I was embedded in the field site as an ethnographer while simultaneously working as a research assistant writing public outreach materials for the National Park Service. In my discussion of qualitative ethnographic field methods, I articulate some of the affordances and challenges of my positionality in the field site and the multiple roles that I played. I elaborate on how autoethnographic methods became relevant and useful for negotiating dynamic overlaps and interactions between my role as an ethnographer and my role as a research assistant. In light of the challenges associated with my insider/outsider status, I explore the uses and limits of autoethnographic methods

for rhetorical field research. I argue that autoethnography offers useful strategies for tracing how a researcher embodies and negotiates multiple shifting, situated, and sometimes competing, identities in the field.

Chapter 5, "A Conclusion: Teaching Writing with Play," returns to the original research questions that shaped this study and offers a vision of how pedagogies of play might be used in science writing classrooms to support rhetorical awareness. One park ranger's reflections on a shift from her early-career experiences of engaging park visitors in emergent, collaborative inquiry to her later experiences in a new role writing resource briefs, press releases, and fact sheets offers a vivid comparison. This anecdote links earlier discussions of different models of public science communication with a discussion of different approaches to teaching science writing.

I discuss how one approach to teaching science and technical writing focuses on the efficient production of texts that demonstrate students' control of genre conventions, and I point to some of the objections that might be raised about integrating pedagogies of play into the science writing classroom. I argue that teaching science writing with play can carve out opportunities for students to experiment with conventional discursive practices or genres and reflect on the assumptions, epistemological commitments, and power relations embedded within those conventions. I offer an example from my own teaching, and I assert that rather than simply teaching students how to play by the rules of any given genre, pedagogies of play offer opportunities for students to test the limits of discursive conventions and become rhetorically aware.

CHAPTER 2

Disturbance and Resilience:

The Grounds for Dynamic Engagement

A Disturbance in Writing

In the fall of 2015, I interviewed a distinguished coastal geomorphologist. I'll call him Dr. Sands. His studies in the northeast region of the U.S. have spanned nearly half a century, and from what I understand, he is a sort of a living legend among his peers. It was a humbling thing for someone like me—a non-expert, and a relative outsider just beginning to learn the language, practices, methods, and issues around this unfamiliar science—to have an audience with him. Because questions about resilience motivated some of Dr. Sands' ongoing research, and because he is so well-regarded, he was clearly an ideal subject for one of the researcher profiles that I would write for NPS. On the day of our interview, I anticipated probing the concept of resilience: what significance it had in the context of his research, what it means, what it can look like, and what was at stake in understanding and improving coastal resilience.

With SEAcomm, it seemed to me as though I had found myself on the same team as scientists like Dr. Sands because we shared an interest in communicating the facts about resilience science effectively for varied audiences, from policymakers, park managers, and tax-payers, to people who have diverse and nuanced relationships with the coastal places in which they dwell, work, and play. Still, I approached our

conversation as a former journalist and narrative non-fiction writer, as a writing instructor and a rhetorical studies scholar—not as a scientist. I had contributed human interest-type science writing to local newspapers and regional magazines for twelve years, and I had written regular features for the Audubon Society of Rhode Island. In short, I knew how to ask questions about and demystify scientific issues, concepts, and practices for a non-expert audience. I supposed Dr. Sands might find my writing useful, too, insofar as it articulated the uses and possible benefits that could be derived from a variety of resilience studies, including his own. Given my experience and the cooperative nature of my task, writing a profile of Dr. Sands, I thought, should have been a pretty straightforward affair. But then Dr. Sands called into question the very plausibility of resilience.

"Now, I'm going to use the term," he said, "and then I'm going to show you that I don't want to believe in it—that's *resilience*. Everybody talks about resilience, the ability to recover." But, he speculated, "Is the system recovering, or is the system establishing a new equilibrium in a new location? Has Hurricane Sandy created such an imbalance that it can't recover?"

For five uninterrupted minutes, I listened and took notes as Dr. Sands clarified and elaborated his counter-perspective to some prevailing ideas about resilience. My gel pen scratched against a small notepad, interrupted only by my frantic flipping to clean pages. Forty minutes later as our phone conversation continued, a car alarm started sounding on the street outside of my apartment. Just then, Dr. Sands became more emphatic about his take on the "so-called resilience motif."

"It's a contrast between expecting everything to go back to normal—back to what it was—versus, no, it's never going to be there again," he said (bLEEp-bLEEp-bLEEp-bLEEp), adding with grand finality, "Your concept of resilience is a fantasy."

Dr. Sands had challenged my expectations. The resilience of natural ecological systems was the underlying proposition that drove some of his research, plus dozens of federally-funded studies. It was supposed to be the answer to building stronger communities. It was also the driving theme for every piece of writing that I produced for SEAcomm and NPS. At the moment, it seemed to me that his challenge to ecological resilience did not recommend itself to my growing portfolio of outreach products that were meant to be fairly uncomplicated celebrations of resilience research.

Dr. Sands had changed the game. He had blown the piece that I was writing about him right off of its logical footing, and now it was my turn. Intellectually, his challenge offered an exciting opportunity. Perhaps I had assumed too much about resilience in the first place, and this unexpected turn would ultimately lead to a more nuanced understanding of resilience for me and those who would eventually read this profile. Creatively, this disruption had the potential to rouse me from a rut in my writing and help me reimagine my approach or even my purposes in creating this profile. But practically speaking, his challenge was a disturbance. I could no longer maintain what, up until then, had become my status quo—*find the resilience link, and build around it*.

Indeed, I could have evaded the issue altogether. In all likelihood, some people would thank me for not over-complicating a 1,200-word piece with an esoteric debate

about a difficult concept. Dr. Sands himself might be the only one to express concern that I had missed his point. Then again, as often happens in translating science for public audiences, he might have been articulating ideas with me that he would never expect or wish for me to include in a published public outreach piece (Fahnestock, 1986, p. 285) Omitting this part of our discussion, and thus favoring clarity over complexity, certain knowledge over the probable, could be the most practical, sensible choice for an accommodation of science for a public audience (Fahnestock, 1986).

Then again, favoring clarity, certainty, and simplicity does not always make for a sound ethical choice (Fahnestock, 1986). And disturbances in a writing process, whatever form they take, can be powerfully generative—even if the process becomes chaotic or the outcome unpredictable (Boquet, 2002; Shipka, 2006; Shipka, 2011; Wysocki, 2004). A strategic approach for negotiating this disturbance would have me abiding the institutionally-sanctioned conventions of existing NPS public outreach texts, probably privileging deontological and teleological arguments, or "wonder" and "application" appeals relevant to Dr. Sands' research, and not complicating these appeals by dwelling in the murky territory of what Dr. Sands referred to as the "resilience motif" (de Certeau, 1984, p. xix–xx; Mathieu, 2005; Fahnestock, 1986, p. 279). However, as Mathieu (2005) argues, a tactical logic is often called for in community-based writing, and by this, she refers to "an orientation [that] requires a critical spirit of inquiry, based not on certainty but on hope" (p. 17). A tactical approach might have enabled me to seize an opportunity "'on the wing'" to destabilize resilience (with Dr. Sands), to mark off some of the "'errant' trajectories" that the concept of resilience makes possible, and to do so in a way that meaningfully engages

people who have a stake in discussions of coastal resilience (de Certeau, 1984, pp. xix, xviii).

Notably, in the instance, as I spoke with Dr. Sands, I was encountering a moment of practical and methodological tension that, doubtless, would not be isolated for me as a participant-observer writing about resilience on behalf of NPS and simultaneously studying the public information and science communication practices of park rangers. As Druschke (n.d.) has argued, instances of productive struggle such as the one I encountered in my conversation with Dr. Sands mark moments in which "the impact and possibility of agonistic terms and points of friction become visible only from the researcher's immersion in the agonistic encounter," and such moments make intervention possible (Druschke, "Agonistic," p. 11).

With disturbance comes tension and unpredictable consequences that are not necessarily positive or negative: a burst of light exposes a gap in the undergrowth, a precarious structure treacherously reveals its flaws, a gathering storm runs off its course. When the stakes are high, when the conversation has reached a certain pitch, when the debate matters, rhetorical disturbance happens.

The Question of Resilience

If this rhetorical ethnography is to faithfully serve its purpose, that is, to go "beyond recording" and engage in "the disciplined and deliberate attention to the shaping power of persuasive language, energies, symbols, objects, discourses, and bodies," it must attend to the question of resilience (Druschke, "Agonistic," n.d., p. 9). For, resilience was the dominant theme of federal response to Hurricane Sandy and the

guiding concept that launched post-Hurricane Sandy recovery and mitigation investments. The concept of resilience also discursively propelled the urgency for public outreach materials related to post-Hurricane Sandy research, thus motivating the cooperative agreement between NPS and SEAcomm, and enabling my own presence and privileged participant-observer status in the park site where I conducted my research. Thus, resilience—its multiple meanings, uses, and underlying assumptions—warrants some considerable critical attention.

In the years following Hurricane Sandy, at Fire Island National Seashore (FIIS) and in public lands across the U.S. east coast, resilience shaped discourse concerning coastal change, land management policy and practice, decision-making related to local infrastructure and development, and public participation. The many-layered discursive realm that constituted the field site I wrote about and studied, plus my engagement in the field site as a participant-observer, were so shaped by resilience that, almost by necessity, it became the predominant lens through which I filtered my practical and theoretical understandings of FIIS, of park interpretation, of coastal communities, of science communication, of community writing, of writing pedagogy, and of play in this field site.

In the context of my writing for NPS and in the context of my ethnographic research, resilience presented several generative questions and challenges, beginning with how in the world would I explain ecological resilience to non-specialist audiences. Does "resilience" in the context of the post-Sandy scientific research have a precise (scientifically-oriented) meaning that my audiences need to know? As

someone who is intent on exploring the possibilities for public engagement in science communication, I also wondered how I might incorporate into my NPS writing openings for engagement, invitations to acknowledge uncertainty, ambiguity, and a multiplicity of perspectives on resilience. When it came to my investigation of park interpretation, I considered what relationship there might be between play and engagement and resilience. To respond to any of these questions is to assume that one understands a little something about resilience in the first place.

Because no stable definition of a concept can exist outside of its identification with specific uses and "ethical attitudes that, as part of the context surrounding it, contribut[e] to its meaning in the realm of motives and action," a concept so influential as resilience invites a closer examination (Burke, 1969, p. 30). Indeed, as Druschke ("Agonistic," n.d.) makes clear, working through the tensions, frictions, and struggles of discursive, symbolic, and material conditions emerging in the field site is precisely the work of rhetorical ethnography. She writes,

> Recognizing that language is never exact, rhetorical ethnographers embrace Cintron's (1997) argument that the "failed expectation" of the word and its referent should be the target of critique (p. 232). We embrace the muddiness of representation and use it to create something new. (Druschke, "Agonistic," n.d., p. 10)

In all its glorious turbidity, resilience is a concept that guides public policy, influences public investments, and shapes specialized, publicly-funded research. As McGreavy (2016) has demonstrated, normative understandings of resilience can be traced through the discourses, motives, and assumptions of those who have the

authority to shape its operative meanings and uses, particularly experts in the biophysical sciences (p. 111). Beyond commonplace or mainstream understandings of the term, which associate resilience with a simple and decontextualized capacity for "bouncing back" (McGreavy, 2016, pp. 104, 113), accounts of resilience within ecosystem ecology are concerned with the complex interconnectedness within and between natural ecosystems and the organisms, environments, and non-living things the comprise them.

One particularly dominant account of resilience is the social-ecological systems view, which integrates human dimensions of and human connections with natural systems. The social-ecological view enables relatively complex understandings of ecological resilience. By resisting, for instance, the isolation of biological, geological, and hydrological features of an ecosystem from human impacts, this orientation instead takes stock of human interactions with natural resources. Thus, in a social-ecological view, resilience refers to the complex system of relations between the changing conditions of a natural resource and changing behaviors and relations among constituent, interdependent parts of the system, whether living, non-living, human, or non-human. In one articulation of this view—an articulation that directly informed at least one post-Hurricane Sandy resilience study—resilience is "the capacity of a system to experience shocks while retaining essentially the same function, structure, feedbacks, and therefore identity" (Walker et al., 2006, Resilience section, para. 1). The language of this definition posits resilience as a broad, systems-based concept and regards human and non-human ecological dimensions as consequential.

This understanding of resilience raised several questions for me. At the time of my conversation with Dr. Sands, I was in earnest to resolve them. I even supposed that Dr. Sands might help clarify things. I wondered, by what standard is "essentially the same" established for any given system? In the case of natural resources in a National Park site—like beaches, dunes, swales, forests, salt marshes—would a resilient system be one which retains the "same function, structure, feedbacks," and so forth, as those that inhered in the system when it was first established as a National Park? Alternatively, is a resilient system one that retains the same "function, structure, feedbacks, and . . . identity" regardless of, or prior to, any anthropogenic stressors? Or does that latter question undermine the whole idea of a social-ecological account of resilience, since it establishes a division between human and non-human interactions within an ecosystem? A third possibility, I supposed, is that maybe a resilient system is one that retains the "function, structure, feedbacks, and . . . identity" that are required by human communities which depend on certain ecosystem services. Or does this question tip the scales of ecosystem stability too much in favor of human interests and needs, without regard to how such an imbalance might make the idea of ecosystem resilience implausible or even oxymoronic?

These questions are not simply the befuddled musings of an outsider. Rather, questions like these shape, to some extent, long-term research of ecosystem trends and change across natural resources in National Park sites, as well as natural resource management decisions. Also, one post-Hurricane Sandy resilience project reflects some of these questions in its aim to challenge historical lapses in the baselines and

thresholds that inform studies of ecosystem resilience. To illustrate, I offer two examples.

"Resilience" in Action: Long-term Ecosystem Monitoring

To show how such questions can shape long-term research, consider the Northeast Coastal and Barrier Network (NCBN), which is one of 32 regional NPS networks across the country that implement NPS's Inventory and Monitoring Program (I&M). NCBN designs, coordinates, oversees, and conducts long-term research in eight park sites within the region (including FIIS) to inform the decisions of natural resource managers. The program manager for NCBN also manages the post-Hurricane Sandy resilience projects initiated through the Disaster Relief Appropriations Act of 2013 and corresponding DOI recovery and mitigation funding, including the SEAcomm project through which I am employed as a research assistant.

"Resilience" is not a driving theme or objective behind NCBN's I&M studies, but "ecological integrity" is (Stevens, Milstead, Albert, & Entsminger, 2005, p. 2). A brief examination of ecological integrity and resilience show how these concepts, both of which drive research at FIIS, are closely related. That is, I would suggest that assumptions about ecological systems that enable monitoring research and definitions of what constitutes "ecological integrity" similarly underlie perspectives on resilience.

First, the intent of monitoring research to support decision-making that may "maintain" or "restore" ecological integrity reflects a concern akin to the maintenance-oriented perspective of resilience, when resilience is defined according to capacities for "retaining essentially the same" conditions (Stevens et al., 2005, p. 2; Walker et

al., 2006, Resilience section, para. 1). Also, the objective of monitoring research to define normal thresholds for change reflects an underlying interest that is analogous to some resilience perspectives—that is, an interest in understanding the parameters that dictate whether an ecosystem can return to "normal."

For example, NCBN's Vital Signs Monitoring Plan (Stevens et al., 2005), a foundational document for the NCBN I&M program, indicates that monitoring research entails, over time, defining "the normal limits of natural variation in park resources," as well as "determining what constitutes impairment," in order to discover what it means for an ecosystem to exhibit ecological integrity (pp. 2–3). The I&M monitoring research is critically important for informed decision-making, as it establishes a baseline of data about natural resources that would not otherwise exist, and this data already has proved its value to resource managers and communities that need to know the full effects of Hurricane Sandy. However, the operative underlying assumptions of resilience and ecological integrity, which are associated with social-ecological systems perspectives have been challenged.

"Resilience" in Action: A Historical Ecology Perspective

One post-Hurricane Sandy resilience project problematizes the operative assumptions in establishing baselines for what "essentially the same" means in any given system. Waldman and Solecki (2014) launched a project called "The Environmental History of Jamaica Bay: A Foundational Monograph," which employs the theories and methods of environmental history and historical ecology to bring historical information to bear on working understandings of the ecologies of Jamaica

Bay, which is located off the south shore of Long Island, west of Fire Island and Great South Bay. Their research aims to contribute to the scientific record historical information that can "identify the agents, locations, and dates of 'drivers' that have perturbed the ecosystem" possibly to challenge and correct "accepted wisdom," false "assumptions," or the faulty "recycling" of misinformation about ecosystem trends prior to the existence of methodical data collection and scientific monitoring studies (Waldman & Solecki, 2014, p. 2). Notably, Waldman and Solecki (2014) propose that "knowledge of [historical] conditions provides a critical baseline for what the system would be in the absence of anthropogenic changes" (p. 2).

This notion of establishing a pre-anthropogenic baseline for ecosystem resilience seems to run counter to the assumptions of the NPS I&M program. The purposes and driving concerns of the I&M program are explicitly tied to human-caused change, human interventions to manage natural resources, and human values and interests (Stevens et al., 2005, pp. 2–3, 5–6, 35). Baseline information from I&M research is being used to inform post-storm recovery and mitigation studies and decision-making. Nevertheless, these two examples—the NPS I&M program's articulation of "ecological integrity" and the work of environmental history to reconcile persistent false assumptions underlying resilience research—show how defining and studying ecosystem resilience is not uncomplicated.

Indeed, even a social-ecological understanding of resilience, expansive enough to acknowledge an ecological role for humans, is seen as partial and limiting. A social-ecological definition of resilience emerges from an assumption that sets human agents apart from non-human agents in an ecological system. New materialist theories reject

this dualism for its disregard of the agency of nonhuman things and its reductive view of the "fundamental entanglement of objects" (Rivers, 2015, p. 429). Rivers (2015) calls for an understanding of human and non-human relations within environments as not "asymmetrical," but rather "deeply ambivalent" and to be approached with "an attitude of equivalence" (Rivers, 2015, pp. 428, 436, 431). In advancing "deep ambivalence" as an "environmental rhetoric" and as "an ontologically flavored rhetoric predicated on a kind of being in the world: being across a flat ontology in which all beings are equally emplaced," Rivers (2015) offers a new materialist approach toward challenging the assumptions underlying social-ecological understandings of resilience. (p. 431).

Challenging Promises of Control, Certainty, and Stability in Dynamism

A Call to "Do Resilience Differently"

Significant research in communication studies demonstrates how a social-ecological perspective on resilience does not distinguish itself nearly enough from oversimplified notions of resilience as "bouncing back" (McGreavy, 2016). As McGreavy (2016) argued, though social-ecological understandings of resilience integrate the complex interactions of humans and non-humans within an ecosystem, such views assign to human agency the power "to exert an inordinate amount of influence over the system" (p. 112); sustain the "illusory" assumption that humans are connected with nature but still distinct from it (p. 114); define vulnerability as "negative risk" (p.115); and embed assumptions about human control that constrain potential responses to ecological change (p. 115). In her analysis of the defining terms,

constituent concepts, ontological assumptions, and "dialectical tensions" that shape social-ecological systems perspectives of resilience, McGreavy (2016) asserts,

> When the constructedness of categories like these is ignored, alternative ways to order ourselves become obscured. . . . When we attend to . . . how the world does not conform to our persistent attempts to order it in these ways, we invite the question of how to dwell differently *with* the world. (p. 115)

At the heart of McGreavy's (2016) call to "find ways to do resilience differently" (p. 117), is a thoroughgoing critique of the discourse and ontologies that shape established social-ecological understandings of resilience, like the one articulated by Walker et al. (2006). Any definitions of resilience as "coping, which relies on reducing vulnerability, resisting and adapting to change, and returning to a desirable situation as quickly as possible" (McGreavy, 2016, p. 109) are only capable of advancing "techno-scientific solutions" and "neoliberal market-based solutions" (McGreavy, 2016, p.114). By problematizing these definitions of resilience, McGreavy (2016) brings to light the possibility for responses "that may be more difficult but also potentially more transformative and sustainable" (p. 114). She seems to argue for responses to ecological change and disturbance that could embrace "our inherent affectability" as a strength (McGreavy, 2016, p. 115).

Perspectives on Dynamic Equilibrium as a Promise of Stability and Control

Dynamic equilibrium, a key concept in understanding what resilience means within the biophysical sciences, also reinforces what McGreavy (2016) refers to as the impulse for "returning to a desirable situation" (p. 109). According to O'Keefe,

Helfield, and Naiman (n.d.), dynamic equilibrium is the "state of existence in which ecological communities persist through time, and adapt to or are modified by disturbance" (p. 4). In this case, the term disturbance refers simply to "a process or event that results in changes" to the physical and biological features of an ecosystem (O'Keefe, Helfield, et al., n.d., p. 4). Identifying a process or event as an ecological disturbance connotes neither positive nor negative assumptions about the process or event itself and the changes that result from it. Rather, change is understood as an innate and constant facet of ecological integrity (O'Keefe, Helfield, et al., n.d., p. 3; Sprugel, 1991, pp. 3–4). Ecosystems undergo extensive changes, "vital cyclic events necessary to the continuation of life" (O'Keefe, Elliott, et al., n.d., p. 3). Some natural disturbances are part of the regular function of ecosystems; they occur within the thresholds of dynamic equilibrium and are part of the long-term evolution and integrity of ecosystems. When humans depend on resources, services, or benefits of ecological systems, a recognition that disturbances are essential events for the continuation of ecological communities is imperative for managing and stewarding natural resources effectively. Natural disturbances that are relevant to coastal ecosystems can range from minor, perennial events to major, episodic events, like hurricanes (O'Keefe, Elliott, et al., n.d., p. 14).

A comparison of Walker et al.'s (2006) social-ecological understandings of resilience with dynamic equilibrium, shows that the two concepts are related. The constant dynamism, change, and fluctuating conditions of ecosystems that are articulated by the concept of dynamic equilibrium are also embedded in the notion of resilience as the retention of sameness even in the event of "shocks" (Walker et al.,

2006). As Sprugel (1991) has pointed out, even as dynamic equilibrium supports a fundamental assumption that change is an innate condition of ecosystems, it also sustains an illusion of stability, a paradoxical idea that Sprugel describes as "psychologically attractive" (p. 4). He writes, "The idea of an area maintained in a dynamic equilibrium by a balance between disturbance and recovery . . . provides some sense of stability even in the presence of constant change" and "satisfies human longing for order in natural processes" (Sprugel, 1991, pp. 4, 5). When it comes to climate change and some patterns of large-scale disturbance events, such as can be found in "Eastern forests along major hurricane tracks," Sprugel (1991) suggests that "achievement of an equilibrium state is unlikely," and he describes a variety of "non-equilibrium systems" (pp. 6, 13).

In his discussion of the implications of non-equilibrium systems," Sprugel (1991) directly challenges a document commonly known as the *Leopold Report*, which, beginning in 1963, guided the National Park Service's (NPS) natural resource management practices (pp. 13–14; Leopold, Cain, Cottam, Gabrielson, & Kimball, 1963). Sprugel takes issue with what is now a fairly notorious premise of the *Leopold Report*, that natural resource management and policy should aim, primarily, to preserve "naturalness," which the report associates with "the condition that prevailed when the area was first visited by the white man" (Leopold et al., 1963, "Policies," para. 4; Leopold et al., 1963, "The goal," para. 2). It is not possible within the scope of this chapter to offer a substantial examination of the patriarchal, colonialist, racist, gendered assumptions embedded in this, a foundational text for NPS resource management, to examine its rhetorical implications, and its consequences for public

engagement, for attunement with and within natural systems, and for social-ecological resilience. For the moment, the salient point in the context of this discussion of resilience is that Sprugel (1991) discredits any attempts at "identifying a specific point in time as epitomizing the 'natural' state" as "ill-advised" (p. 13).

In a 2012 report of the NPS Advisory Board Science Committee commissioned by then-NPS Director Jonathan B. Jarvis, the authors "revisit" the "wildlife management" "goals," "policies," and "methods" recommended in the *Leopold Report* and make recommendations for "goals," "policies," and "actions" for "resource management" in a new era. (Colwell et al., 2012, pp. 7–8, 11–12). Among the many significant observations that the authors make are that "*Continuous change* is not merely constant or seasonal change; it is also the unrelenting and dynamic nature of the changes facing park systems," including "volatile swings in conditions . . . within long-term trends of change" and "extreme events" that "increasingly exceed historic experiences" (Colwell et al., 2012, pp. 11–12). The authors emphasize that there is uncertainty and incomplete knowledge around "system complexity and interrelatedness," which warrants their recommendation that resource managers "rely on science for guidance in understanding novel conditions, threats, and risks to parks now and in the future" (Colwell et al., 2012, pp. 6, 12).

Between 1963, when the *Leopold Report* was issued, and 1991, when Sprugel described non-equilibrium systems, and 2012, when the NPS Advisory Board Science Committee issued its recommendations, it would seem as if attitudes changed to reflect a growing recognition of environmental change on a scale and of a magnitude that perhaps preclude the kind of resilience implied by a concept like dynamic

equilibrium. The change in perspective also seems to reveal a reconsideration of human understanding of and control over complex systems. Where Leopold et al. (1963) project a vision of dominance over nature such that it can be known, ordered, maintained, and fixed through human intervention, Colwell et al. (2012) seem to leave this domineering perspective behind, instead presenting a view of a natural world that is complex, chaotic, in-flux, unstable, and only ever partially known. This latter perspective suggests a sort of vulnerability that resilience discourse works to stave off (McGreavy, 2016).

Tactical Engagement with Disturbance: Making Something of Change and Crisis

McGreavy (2016) draws out of the muddiness of resilience a retooled understanding of vulnerability not as weakness, but as asset (pp. 115–116). The capacity for humans and natural resources to be affected becomes a condition that begs to be mined or leveraged, that calls for "opening up affectability within material ecologies [which] may enhance creativity and transformation" (McGreavy, 2016, p. 116). Instead of inciting domineering, efficient, or aggressive resistance, and instead of triggering management responses that aim to seize control, disturbance becomes an opportunity to learn and experiment, to discover how to *go with* changing conditions no matter how unpredictable. Disturbance provokes tactical responses that *make something of* change and crisis. Thus, McGreavy's analysis of resilience discourse problematizes established perspectives and urges a new understanding of resilience that positions disturbance, too, neither as a potentially destabilizing threat that needs to be "managed" (McGreavy, 2016, p. 112), nor as an exigence to dampen or prevent

change and to return, almost impulsively, to "the same function, structure, feedbacks, and therefore identity" (Walker, 2006, Resilience section, para. 1). This alternative perspective on resilience instead recognizes disturbance as the changing material ecologies that make transformation exigent and that enable creative, clever, nuanced, fluid, spontaneous, and kairotic responses in a new kind of resilience game.

Calls to Do Park Interpretation Differently

In the years since Hurricane Sandy, decisions about the management of coastal natural resources have fueled public debate in communities across the northeast, and because the ongoing post-storm resilience studies are designed to inform pending management decisions, they promise to stimulate public deliberation for years to come. In this context, complex interconnected systems that are vital for human and nonhuman life are changing as a result of storm events, sea level rise, climate change, coastal engineering, fishing industries, urban and coastal development, the design, construction, and maintenance of infrastructure including roads, parking lots, and wastewater treatment systems, the chemical treatment of lawns in coastal communities, as well as decision-making processes and the policies established to implement responses to change. While change is an inevitable part of these systems, the acceleration of sea level rise and the predictable increase in frequency and intensity of storm events offer evidence for the likelihood that coastal areas will undergo change of a scale and magnitude and with a frequency against which coastal communities, as they exist today, have only been tested minimally, and with devastating results.

Thus, it has become increasingly important for scientists, policymakers, and land managers to learn about resilience so they can examine opportunities for responding change on scale that is unprecedented. For the same reasons, it is also increasingly important for diverse publics and other stakeholders—including local industries and institutions that have property and other interests in coastal communities, as well as municipal leaders, elected representatives, members of civic and advocacy groups, and concerned citizens, including people who own homes and other property in coastal communities and people who value coastal public lands for their educational, cultural, and recreational benefits—to understand what resilience can mean for the future of their coastal communities and to be engaged in decisions about policy, land management, development, and coastal engineering that are ordered around a discourse of resilience (McGreavy, 2016).

The call that McGreavy (2016) makes, and the possibilities that she describes for resilience, are beginning to play out within the context of NPS public outreach, public information, science communication, and park interpretation efforts. NPS scientists, park managers, and staff are exploring new ways to engage diverse publics and stakeholders in developing shared understandings of the complex consequences of ecological disturbance, natural disasters, and climate change and in learning what resilience can mean for their coastal communities. They are doing this, for instance, through a cooperative agreement with the Society, Ecology, and Communication Laboratory (SEAcomm). Instead of relying automatically and exclusively on an objectivist paradigm of scientific research to answer the questions of resilience—and also, instead of depending exclusively on technocratic models of public

communication of science—NPS is making something of change and crisis by forming collaborations that connect scientists in the field with scholars of rhetoric and graduate students studying environmental communication, and that connect park managers and park interpretive staff with rhetoricians to explore, together, the discursive transformations that ecological disturbance makes exigent and makes possible. My observations of and participation in public outreach and park interpretation at Fire Island National Seashore (FIIS) also reveal how park staff are exploring what public engagement through park interpretation might mean and do for coastal communities in the context of a new kind of resilience game, one that assumes that changing natural ecologies make social and discursive change exigent and enable social and ecological engagement that is more fluid and dynamic, tactical and kairotic. These changes seem to mark a recognition that social resilience begins with shared understandings of the consequences of environmental change and the possibilities for stewardship through tactical, grounded social action geared toward science-based and socially just decision-making.

Public Engagement and Play at Fire Island National Seashore

As part of a new vision for park interpretation, National Park Service (NPS) interpretive staff are transforming park programming to generate dynamic engagement between and among park visitors, park staff, and park resources. This has been the case at Fire Island National Seashore (FIIS), where NPS interpretive staff are reinventing their approaches to teaching visitors about science-based issues in the park

in light of storm impacts resulting from Hurricane Sandy, subsequent scientific inquiries into coastal resilience, and the probable impacts of climate change.

Located off the south shore of Long Island, New York, FIIS was established as a National Park in 1964. It owes its existence largely to the combined efforts of private citizens, local citizens' groups, state agencies, and national organizations that coordinated efforts to protect Fire Island from the threat of highway and other infrastructure development. Robust civic action and engaged public discourse remain part of the fabric of Fire Island, its history and culture. According to the estimates of FIIS park managers and interpretive staff, most visitors live within 500 miles of the park, and a considerable number of those people are Long Islanders who live just across Great South Bay. Still others own property on the island or otherwise call Fire Island home. FIIS proper contains some 4,000 households across 17 in-park communities. In 2012, nearly half a million people visited FIIS for recreation.

Local residents, including in-park residents of Fire Island, who suffered life-changing losses as a result of Hurricane Sandy recognized their stake in park management decisions related to storm recovery and mitigation efforts and toured park sites in the months following the storm. As several interpretive park staff and park managers pointed out, they visited, as usual, to enjoy the recreational activities and places of natural beauty in the park, and they also came to see the changes that the storm wrought in different parts of the island and to talk with park staff about pending park management decisions related to storm recovery and storm mitigation.

Interpretive staff at FIIS describe their interactions with park visitors at the time—particularly their exchanges with local stakeholders—as by varying degrees

emotional, uplifting, challenging, tense, and now and then even somewhat hostile. NPS staff were immediately confronted with the enormous task of translating a growing corpus of scientific briefs and official communications, reporting on the vast storm impacts, and contending with conflicting views about the science behind management decisions.

In addition to the immediate storm impacts that had devastated coastal communities, Hurricane Sandy had caused both short- and long-term changes across Fire Island's natural resources. Dozens of scientists descended on Fire Island to launch studies investigating how natural resources in FIIS had changed as a result of Hurricane Sandy. They are using their data to develop models that will benefit the park as well as coastal communities by showing how coastal resources might fare in light of future storms, sea level rise, and climate change impacts. No matter how promising the prospect of their data and models, scientific findings that could inform park management decisions are still preliminary or forthcoming four years later. For a time, a substantial amount of uncertainty prevailed around questions about how park managers would ultimately respond—beyond, of course, their initial decision at times to defer until more data was available to guide further action. Meanwhile, public concern about the post-storm management of park resources drew park managers and local stakeholders into heated debate.

One challenge that seems acute in relation to science communication about the impacts of Hurricane Sandy is this: ecosystems don't abide by the logics that structural resources do. While infrastructure becomes obviously hazardous as a result of storm impacts—a road, for example, becomes obviously hazardous when it is flooded—

large-scale changes to dynamic natural resources can produce ambiguous impacts. The ecological concept of "disturbance" encapsulates this ambiguity. As an ecological concept, "disturbance" takes on a neutral meaning that acknowledges change—including the sort of extensive change that powerful storms can cause—as an innate condition of natural ecosystems (O'Keefe, Helfield, et al., n.d., pp. 3–4; Sprugel, 1991, pp. 3–4). Moreover, coastal storms do not necessarily stress natural resources as much as anthropogenic factors do, and it is not uncommon for ecosystems to derive benefits from significant and sudden change.

For example, Hurricane Sandy caused ocean waters to tear through Fire Island's dunes, resulting in a breach through which ocean and bay waters now mix freely. At first glance, the breach appears precarious. It is situated in the middle of the 32-mile barrier island, which has long been regarded as a buffer against storms approaching developed areas on the south shore of Long Island. Still, the breach does not signify a "broken" ecosystem. Preliminary observations suggest that by flushing harmful algae out of parts of a polluted Great South Bay, the breach might create opportunities for commercially, recreationally, and ecologically significant species to rebound. Scientists are monitoring the breach to gather data that can inform resource managers' decisions about whether and how to intervene. Meanwhile, the breach offers a unique opportunity for scientists to study its immediate and short-term ecosystem impacts. But amid all of the catastrophic, life-changing losses that Hurricane Sandy caused, this story of ecological resilience and scientific advancement risks sounding like a silver-lining. The large-scale efforts underway to understand scientifically and to mitigate the impacts of Hurricane Sandy on coastal natural

resources notwithstanding, community resilience does not spring from the resilience of natural resources alone.

While park managers await the findings of key studies on the breach and other storm impacts, they remain subject to public scrutiny particularly among people who live on the south shore of Long Island and thousands of homeowners across Fire Island who have a stake in pending resource management decisions. Park interpretive rangers are responsible for doing the challenging work of synthesizing scientific information, including the findings of more than thirty park-based post-Hurricane Sandy resilience studies, and communicating the significance of this research for public audiences. As interpreters, they aim to produce dynamic informative programs that integrate historical, ecological, economic, cultural, political, and structural contexts, to capture the diverse consequences of and understandings of storm impacts. Disturbances to the status quo in park interpretation—especially following Hurricane Sandy—called for a multi-pronged approach to change, including the production of a new interpretive plan, the development of a new approach to training park staff in more engaged interpretation, and individual and collaborative writing among all park interpretive park staff to create engaged park programming and test it in the field.

In the context of conflicting interests and views around post-Hurricane Sandy storm mitigation and park science, and more generally, the social and scientific complexity related to the impacts of Hurricane Sandy, FIIS interpretive staff set about testing new methods for park interpretation and reinventing their approach to educating park visitors about park science. Their new plan, which is still a work-in-

progress, expands interpretation to engage diverse understandings of ecosystem dynamics, environmental disturbance, and resilience, while making in-park programming more interactive. Senior interpretive rangers at FIIS express an interest in acknowledging some of the complexities of public deliberations over recovery and mitigation efforts. And their new approaches to teaching people about science-based issues in the park take stock of the accounts of individuals who dwell, work, play, and own (or lost) property in places affected by the storm.

Recognizing the need to engage with and educate people about the facts of the breach, for example, park interpretive staff at FIIS instituted guided Beach-to-Breach hikes. Throughout the 2.6-mile hike, park interpreters solicited participants' questions and oftentimes their personal experiences related to Hurricane Sandy. These hikes created an unscripted, dialogic, embodied way of engaging people with FIIS's natural resources, stimulating open-ended conversation, and teaching people about science-based issues in the park. They enabled park visitors to witness the breach and talk with park rangers about what is known and how ongoing studies could inform decision-making.

Also, while the new interpretive plan was a work-in-progress, FIIS staff were actively engaging the knowledge and experiences of veteran and novice interpretive rangers alike to imagine and tinker with possibilities for reciprocal engagement between park staff and visitors. Early in the summer of 2015, FIIS interpretive rangers convened for a two-day science communication and park interpretation training. The training of interpretive rangers is dominated by what any writing studies scholar would recognize as instruction in writing and rhetorical awareness.

Interpretive staff learn, for instance, how to compose social media content and proposals for new interpretive programs; how to tailor existing park interpretive programs for different audiences and contexts; how to translate written resources made available by park scientists and the public information officer, such as suggested "talking points" on topical issues; and how to respond on-the-fly to changing contexts. In these ways, the interpretive training foregrounds what a writing instructor might call the "global" issues of public writing. Participants in the training that I observed in the summer of 2015 joined in a photography shoot and storytelling activities, collaborative writing and role-playing games. They created illustrations and multimodal compositions, and engaged in reflection, crowd-sourcing activities, and open-ended discussion and debate. In pursuit of developing new approaches for engaging park visitors with park resources, senior park interpretive staff started by training new and seasonal staff through collaborative exploratory activities that called for open-ended outcomes, elicited unpredictable responses, and allowed participants to shape their own learning experiences. In other words, senior interpretive staff at FIIS were integrating playful methods into their interpretive training.

Through play and collaborative inquiry in their own training, FIIS interpretive rangers are disrupting traditional modes of engaging with park visitors. By engaging with public audiences in unscripted, dialogic, embodied ways through Beach-to-Breach hikes, interpretive rangers at FIIS are opening spaces for participants to give voice to personal, affective, local, social, cultural, and political knowledges that they bring to bear on their learning experience. These examples of change in park interpretation demonstrate how interpretive rangers at FIIS are taking risks in their

community-based science communication practices and fracturing some of the underlying assumptions that once prevailed in their past styles of science communication, which emerged from a deficit model.

Social-Ecological Resilience through Play and Public Engagement

In the wake of catastrophic storms and other environmental disturbances, as policymakers, resource managers, and citizens come to terms with the possibilities for and constraints on recovery and mitigation, it seems plausible that moves toward more engaged public science communication—like those represented by park rangers' efforts at FIIS—can contribute to and strengthen community resilience. Park interpretive rangers' efforts to discover shared understandings of storm impacts and other environmental change is not merely a matter of distributing scientific information, as a deficit model of science communication would suggest (Gross, 1994, pp. 6, 8, 19). Their evolving playful science communication and public engagement strategies position park visitors as stewards of coastal natural resources and establish a means for experts and officials who study and manage public natural resources to learn how diverse publics are making sense of storm impacts and storm mitigation investments.

With such an understanding, resource managers, scientists, and science communicators who are accountable to the public can discover how better to engage with, educate, and learn from diverse stakeholder communities about science-based issues that will impact public resources. Through deliberate, open, and inviting dialogue, and through interaction that allows for unexpected outcomes, park

interpretive staff may find themselves in a position to interpret both the science behind management decisions and the traditionally marginalized and diverse understandings that local publics bring to bear on public debates over storm recovery, resilience research, and the potential consequences of or alternatives to pending management decisions.

In situations where public engagement is tied to the need to educate citizens and public stakeholders about science-based issues in public lands, playful, engaged interpretive activities may take on the serious role of supporting resilience among both natural resources and communities of people. Playful approaches are important because they open opportunities for participants to engage in open-ended conversations about park science, and to actively influence, generate, and shape their learning experiences. Moreover, playful approaches can do the serious work of communicating scientific knowledge that is necessary for informed decision-making while still honoring local, social, cultural, and political knowledges that might otherwise be marginalized through science communication methods that are faithful to a deficit model.

From a scholarly perspective, I see this possibility emerging at the intersections of writing pedagogy, scholarship in community writing, environmental communication studies, and theories of public understanding of science. Particularly relevant are, to name a few, Rouzie's (2000) assertion that play does rhetorical work (p. 633), Higgins, Long, and Flower's (2006) elevation of situated knowledges as resources for public inquiry (pp. 9–43), Endres's (2009) observations about the marginalization of situated knowledges in technocratic models of science

communication (pp. 49–75), and Gross's (1994) formulation and critique of a deficit model of public understanding of science (pp. 3–23). I also see this possibility emerging from the practices of park interpretative rangers at FIIS, from the efforts of NPS to do public outreach differently, particularly in response to the exigencies of storm mitigation, and from the implications that ecological disturbance has for ecologies of writing and public engagement. Dynamic public engagement in science-based decision-making can contribute to resilience. By resilience, I do not mean a capacity for returning to an ordered, predictable equilibrium state, but rather a social-ecological resilience that attunes to complex, non-equilibrium ecosystems and mobilizes a holistic recognition of and responsiveness to disturbance as generative rhetorical, affective, embodied ecological change.

Disturbance, in some form or another, already inhered in the notions of play that I brought to bear on my study of park interpretation. Disturbance inheres because rhetoric emerges out of agonistic discovery, evaluation, and deliberation, and out of difference, contingency, and complexity. Where an art of rhetoric shapes public life, disturbance, difference, disruption, and uncertainty might justifiably seem, perhaps paradoxically, like the order of the day.

Rhetorical theories and concepts in writing studies that relate to playful rhetorics and pedagogies of play seem to point frequently to disturbance, and even chaos, as a catalyst for open-ended experimentation, broader consideration of diverse approaches to making meaning, and a more robust critical exploration of multiple possible readings or understandings of texts and contexts (Boquet, 2002; Wysocki, 2004; Shipka, 2006; Jarratt, 1991; Colby & Colby, 2008). Moreover, many of the

same scholars would argue that the reverse also to hold true, that playful rhetorics have the potential to induce disturbance.

The engaged approaches of public science communication and interpretation at FIIS support community resilience in the context of ecological disturbance by stimulating reciprocal exchange between scientists, resource managers, science communicators, and diverse public audiences and stakeholders, and by stimulating a more open-ended, multivocal exploration of alternate ways of interpreting dominant or popular narratives about disturbance, dynamic ecologies, environmental change, resilience, and the roles that humans play within natural ecologies. Community resilience emerges from shared understandings of the consequences of environmental change—whether episodic, perennial, or otherwise—understandings which enable policymakers, experts, and public stakeholders to support and enact science-based and socially just decision-making, not just through official channels, but also informally and tactically as civic groups, local organizations, and citizens take responsibility for public lands, by connecting their private property, lifestyles, bodies, discourse, and everyday practices with public places, values, and ecological change, and by becoming stewards of natural resources.

CHAPTER 3

Movement and Migration: Rhetorical Ecologies, Natural Ecologies, and Situated Knowledges in Public Science Communication

Some channel deepening seems called for.

– Robert M. Pirsig

Barrier Island Dynamics: Notes on Non-Living Ecological Forces

Barrier islands are constantly changing. They morph and migrate as a result of complex natural processes that stimulate the movement of sediment, which can shift gradually or in great flourishes. From the earliest days of a barrier island's existence, sediment blows back from ocean beaches. Beachgrass captures the sediment, stabilizing it, and once the beachgrass is partially buried by sediment, it sends out new rhizomes, or underground stems. The beachgrass and its biological responses to the movement of sediment support the formation (and re-formation) of dunes. Wind, waves, longshore currents, tides, disturbance events such as storms, as well as coastal engineering and other human impacts affect how sediment gets moved onto, across, over, and off an island. When storm waves strike dunes, large quantities of sand wash across the island, diminishing the dunes temporarily but also elevating the height of inland and bayside areas. Sediment daily gets picked up by the force of regular ocean currents near shore and amasses on another part of the island—in the case of Fire Island, this accumulation, or accretion, of sediment from longshore currents occurs at

the western edge of the island. So much sediment has amassed there, that a lighthouse, built in 1858 at the island's western edge, is now situated six miles east of the island's current westernmost point. Sediment erodes, too, for many different reasons, including sea level rise. In short, barrier islands and their shorelines are highly dynamic and ever-changing.

As a barrier island, Fire Island is a vital place—biologically, physically, ecologically, and economically. But it began its life, so to speak, as a mere sandbar. As it evolves, the barrier island gains and loses elevation. Through a process called succession, it has given rise to diverse habitats for vegetation and wildlife. The island supports important terrestrial, marine, and estuarine ecosystems, not the least of which are the valuable salt marshes that line Great South Bay and a globally rare, old-growth American holly forest called the Sunken Forest, which is one of only two of its kind in the world.

All of the evolution that has occurred on Fire Island to make it such a vital place hinges, at every stage, on the dynamic movement of sediment from the shoreline. All that the barrier island is can be traced to particles of sediment moving and interacting in response to other forces and disturbances, in response to biology and structural formations, and more. Volumes of sediment build up in various locations to form a landmass that rises above sea level. A primary dune forms. As vegetation takes root on and behind the primary dune, the island becomes—in a partial, contingent way—more structurally stable, because the roots of plants, like beachgrass on the primary dune and shrubs behind it, hold sediment in place, prevent some of it from blowing away with gusts of winds or storm waves.

But the simple accretion of sediment is not enough to bring into being a barrier island that can sustain an ecologically vital system with beaches, dunes, salt marshes, swales, and forests. The dynamic movements of sediment on and around a barrier island give it a complex, ever-changing physical geography with which it sustains mature forests, ephemeral primary dunes, critically important wetlands and salt marshes, populations of migratory birds, and communities of people.

The complex rhetorical ecologies of science communication and interpretation at Fire Island National Seashore (FIIS) can only be understood in relation to the following: the dynamic natural systems of the island; the written policies for managing these systems; the documented scientific protocols for learning about and monitoring changes in the coastal environment; the concepts, metaphors, and polarized terms that shape understandings of the island, of its natural systems, and of the coastal engineering methods used to control it; the contested terms mobilized in public discourse about resource management decisions; and the values, attitudes, and practices of science communication, including beliefs about who should speak and what counts as knowledge in public discourse.

Dynamic rhetorical ecologies matter for science communication, park interpretation, and science-based decision-making at FIIS. Rhetorical channels and currents across multiple symbolic dimensions shape how people know, make sense of, speak about, write about, connect with, or attune to Fire Island and its natural systems, including discursive practices and material conditions that arise from and that constitute human interactions with natural environments on and around the barrier

island. Technocratic approaches toward science communication are notable among the discursive practices that matter to and shape natural ecologies. Technocratic rhetorics limit inquiry and dialogue, foreclose on public engagement, create division, reinforce distrust between experts and non-experts, and overlook rhetorical issues that do not have scientific or technical solutions but that nevertheless have considerable bearing on science-based decision-making, its consequences and outcomes.

Decisions about resource management that are informed by scientific and technical findings are rhetorical, contextual, and not disinterested. Discursive, symbolic, social, cultural, affective, material, environmental, institutional, economic, and political dimensions shape interpretations of scientific studies as well as the opportunities for action derived from and articulated in scientific publications and technical reports. Technocratic models of science communication make invisible or moot the rhetorical ecologies of scientific observations by artificially engineering a one-way flow of information to an audience that is presumed passive. I would argue that engagement, made possible through dynamic, dialogic public participation in science-based decision-making, can bring "people's lives into meaningful relationship with one another in a shared world" by making something of the dynamic interdependence of biological, physical, material, embodied, discursive, human and non-human, living and non-living dimensions of rhetorical ecologies (Crick & Gabriel, 2010, p. 221).

This chapter began with a description of the shoreline dynamics of barrier islands. In linking material ecological processes that take place in the natural world with the dynamism of rhetorical ecologies in science communication, I am not only

proposing an analogy that compares the dynamic and in-flux movements of sediment to the dynamic and in-flux shifts of discourse and symbolic relations that shape human attunements with natural systems. In the context of Fire Island and in the context of public debates about resource management in FIIS, the materiality of shoreline dynamics are not just analogous, but are embedded within the rhetorical ecologies of resource management and public deliberation—shaping and shaped, ordered, and controlled by dynamic material-symbolic rhetorical ecologies. As people living in and around Fire Island, and as park visitors and park rangers attune to the complex natural ecologies of a post-Hurricane Sandy Fire Island, they are doing so through language—not only through translations of scientific concepts, but also through narrative and anecdote, through embodied interactions with the island ecosystems, including Great South Bay, and within the context of complex material changes not easily reconciled with normative understandings of words like "destruction" or "recovery" or "resilience." All of these means of attuning to and responding to changes in the physical and natural environment contribute to how people make sense of the situation and how they symbolically, materially, and structurally order those natural systems.

Flagged for Development: Symbolic and Material Ordering of Vital, Dynamic Natural Systems

The fact that barrier islands and the landscapes and ecologies that comprise them are characterized by constant change and dynamism is an important source of tension. Vitality can be found in systems that depend upon disturbance. Shoreline dynamics imply a characteristic, special variety of instability (although even this word

is too normative) that is integral to system vitality. However, human communities make demands upon barrier islands, many of which demands impose a significant expectation of material stability.

For example, the rate of elevation gains or losses on barrier islands like Fire Island can matter a great deal to ecological vitality, even on a scale of millimeters. One of the "vital signs" tracked by NPS's Northeast Coastal and Barrier Network (NCBN) Inventory and Monitoring Program (I&M) is salt marsh surface elevation. The communities of organisms that comprise the fundamental biological, structural, and functional features of a salt marsh survive within a small range of elevations, where tides contribute to an environment that is part of the time submerged and part of the time drained. A change in the surface elevation of a salt marsh caused by sea level rise, even on a scale of mere centimeters or millimeters, could result in dire consequences for the salt marsh ecosystem itself, for the communities of organisms that depend for their survival on the salt marsh, for connected bay and upland ecosystems, and for the human communities (coastal and beyond) that rely on the far-flung benefits that salt marshes provide (Stevens, Milstead, Albert, & Entsminger, 2005, p. 14). Yet, some fifty percent of coastal wetlands in the United States have been lost, predominantly as a result of human impacts and coastal engineering designed to stabilize natural systems according to the needs of industries and people which set down their roots within dynamic coastal ecosystems (Stevens et al., 2005, p. 22).

Salt marshes cannot endure a change of surface elevation on a scale of millimeters, but by contrast, an elevation change of more than a dozen meters in a

single day on the primary dunes on the other side of the island is beneficial for salt marshes. During an April, 2016, public hike that Fire Island National Seashore (FIIS) organized in tandem with its 10th Biennial Fire Island Science Conference, the park's chief of natural resources management drew participants' attention to the primary dunes within a federally protected wilderness in the park site, the Otis Pike Fire Island High Dune Wilderness. On that day, the height of the primary dunes was so slight that, in many places, the only way to clearly identify where the beach ended and where the dunes began was by a series of symbolic flags posted at the toe of the dunes to protect them. The signs implicitly alerted visitors not to walk there. Before Hurricane Sandy, we were told, the dunes were around forty to sixty feet high in some spots along this stretch of the wilderness.

Overwash is the process by which storm waves sweep sediment off of the primary dunes, delivering it to other parts of the barrier island, thus increasing the elevation of locations behind the primary dune. In time, sediment accumulates to elevate the dunes once again. These changes are part of the natural processes that move sediment around to support life on Fire Island, including critical ecosystems like salt marshes. Salt marshes, in turn, sustain populations of migratory birds, provide shelter from predators as well as nesting and feeding grounds for fish and shellfish. Salt marshes also reduce coastal erosion, buffer wave energy, absorb storm surge to protect upland areas from flooding, and improve water quality in Great South Bay, which is situated between Fire Island and the south shore of Long Island (Stevens et al., 2005, p. 14). In other words, processes like dune overwash figure as disturbance events that result in change, change which is essential for both the ecological

resilience of a barrier island and the benefits and services it provides to communities of people inhabiting and making a living on and around the island.

To a coastal ecologist, biologist, or coastal geomorphologist, these are the plain facts of a dynamic system. However, one popular understanding of overwash, especially salient to people who own property on the barrier and just behind the primary dunes, and also relevant to those who live across the bay on the south shore of Long Island, is that the barrier island is "a line of defense" (Foderaro, 2012) against weather events, a structural buffer that can absorb some of the force of storm waves and storm surge to protect coastal development. This militaristic metaphor falls short of accurately describing what a barrier island is and how it remains vital over time. The barrier is a whole and dynamic system—from its beaches to its primary dunes to its salt marshes, including its migrating, moving, shape-shifting ways, and taken together with its breaches and overwashes. When they are not eroded by human impacts (the symbolic flags at the toe of the dune help alleviate this issue), overwashed dunes accumulate sediment again, time after time, though the scale of re-growth may seem too slow to accommodate the urgency of property owners who prefer a permanent, more rigid, or more visually voluminous physical barrier between the open beach and their front doors. As a result, natural processes (like overwash and barrier breaching) that can support ecosystem vitality and resilience are also, in some contexts, and often paradoxically, recognized by coastal communities of people as adverse.

The Limits of Metaphor and Binaries for Communicating Uncertainty about Dynamic Systems

Because Fire Island, as a barrier island, can be expected to change and develop, in both predictable and unpredictable ways, because it migrates, and because it has grown over thousands of years, eventually giving rise, 300 years ago, to advanced, complex ecosystems like the Sunken Forest, it seems almost alive itself. Fire Island's dynamism is inextricably linked with and constitutive of the dynamism of many connected biological communities, human communities, and surrounding coastal communities, from the migratory birds that stop over seasonally, to the hard clam populations living in shallow waters just off the island's bay shore, to the homes, neighborhoods, and highways across the bay. Most would agree that a barrier island is not literally alive, though. However useful this metaphor may seem—for narrating, describing, and translating natural phenomenon, for reconciling technical information with public, non-specialist discourse, for developing compelling, widely accessible narratives out of scientific jargon—it is also risky.

Metaphors in science communication, especially anthropomorphic metaphors, entail value and risk. As Gross (1994) has pointed out, metaphors are "thought-configuring" and have ethical and political implications in science communication as elsewhere (p. 5). A metaphor can represent a powerful constitutive force of reasoning, more powerful even than stark, literal, precise fact (Lakoff, 2010, pp. 72–73). As Lakoff and Johnson (1980) asserted, "We define our reality in terms of metaphor. . . . We draw inferences, set goals, make commitments, and execute plans, all on the basis of how we structure our experience, consciously or unconsciously, by means of

metaphor" (p. 485). Nevertheless, metaphors and other figurative language, literary styles, or rhetorical devices are sometimes viewed in science writing contexts as distorting and threatening of both objectivity and accuracy.

One problem with casting a barrier island as itself living and following a life cycle is that this metaphor situates a barrier island within a restrictive binary frame of mortality which (like resilience), bestows a false sense of certitude and stability upon a system that cannot objectively be reduced to "alive" or "dead," "well" or "ill," "on the mend" or "under the weather." In science communication, metaphor can obscure gaps in knowledge and omit inconvenient complexities, or the hedges, qualifications, and acknowledgements of uncertainty that are made explicit in scientific literature, thus serving primarily the science writer's or science "accommodator's epideictic purpose"—to promote the wonders and the practical applications of scientific pursuits (Fahnestock, 1986, pp. 283, 279).

As scientists, resource managers, interpretive staff, science communicators (including myself), the media, and concerned citizens communicate with one another about the conditions of park resources following Hurricane Sandy, and about the findings of scientific research related to the resilience of natural resources on Fire Island, the impulse to evoke frames and locate metaphors from within simple bipolar opposites is tempting. Bipolar oppositions like resilient/vulnerable, living/dead, stable/unstable, protected/defenseless implicitly offer a comfortable sense of certainty, stability, or control.

However, change within the context of dynamic natural systems like barrier islands cannot usually—and often cannot accurately or truthfully—be reconciled with

a convenient binary order. This presents an acute problem for park interpretive staff communicating about shoreline change and storm impacts. Two defining facets of science education, public outreach, and science communication efforts at FIIS are communicating dynamism and communicating uncertainty. Even with the benefit of much research on Fire Island, its ecosystems, the vital signs of its natural resources, and its post-storm conditions, uncertainty around the future of Fire Island persists. With or without metaphors, communicating such uncertainty to non-specialist audiences, stakeholders, and publics who have a variety of sometimes competing interests in the integrity of Fire Island, is a practice fraught with difficulty and with the need to engage audiences, to establish common understandings around the limits of knowing a dynamic system, and to provide information with which non-specialists can engage meaningfully in decision-making processes.

Writing the Wilderness Breach: Beyond Loss and Container Models, Through Uncertainty

During Hurricane Sandy, a virtually unprecedented storm surge caused three breaches off the south shore of Long Island, two of which occurred within Fire Island National Seashore (FIIS). A breach is a naturally occurring, and not mechanically reinforced, channel across a barrier island which allows ocean water and bay water to mix freely. Within a month of the storm, one of the two in-park breaches caused by Hurricane Sandy was closed mechanically by the Army Corps of Engineers (ACE). That is, it was filled with sand that had been dredged from another location. The closure was executed according to the terms of a Breach Contingency Plan (BCP),

which was established for 83 miles of coastline between Fire Island Inlet to the west and Montauk Point to the east (U.S. Army Corps of Engineers, 1996). However, the BCP excludes a seven-mile-long federally protected wilderness area within the park, the Otis Pike Fire Island High Dune Wilderness. The second in-park breach occurred within the Otis Pike wilderness, and it remains open as of this writing, more than four years after Hurricane Sandy.

Within days of the storm, in news reports and press releases, some influential politicians and representatives of federal and state agencies expressed arguably reductive generalizations about barrier breaches by indicating that breaches represent a loss of natural structural support and protection for coastal communities along the south shore of Long Island. Less than a month after the storm, Timothy Bolger (2012) of *Long Island Press* reported that U.S. Senator Charles Schumer and the New York State Department of Environmental Conservation Commissioner Joe Martens were raising alarm about the "the breach's likelihood to flood southern mainland [Long Island]" (para. 9). According to Bolger (2012), Sen. Schumer urged park managers to "'drop any environmental objections' to closing that breach" and act immediately to fill it (para. 7). Sen. Schumer's stance was widely reported across local and regional news media (Van Sant & Dooley, 2012; Foderaro, 2012). A press release issued by the office of the governor of New York State likewise defined breaches, without qualification, as hazards that should be repaired expeditiously to protect coastal communities from flooding (Office of the Governor of New York State, 2012). These accounts typically omitted any acknowledgment of the benefits of barrier breaches, like how they have the potential to reinforce barrier islands precisely in their most

vulnerable locations. Such assertions, whether explicitly or implicitly linked with the discussion of the wilderness breach, have since fueled arguments advocating for a swift closure of the wilderness breach.

The literal and metaphorical understandings of a breach being "filled" mechanically—a metaphor common to engineers, policymakers, resource managers, the media, and private citizens alike—can be problematic since it suggests that the barrier has container-like qualities that would enable it to be filled to some proverbial brim, or to hold securely its contents. The same metaphor operates in the language of "loss" that circulated following the formation of the wilderness breach (Foderaro, 2012). Since Fire Island is a dynamic, migrating, and ever-changing place which is characterized by the constant accretion, erosion, and transport of sediment across all of its surfaces, both above and below water and from its beaches to its swales to its bay-side salt marshes and mudflats, "loss," in this context, represents something more like a figure of speech than a matter of fact. When "loss" is supplemented for "breach" and for the dynamic movement of sediment, it is an oversimplification of a complex process which defines the barrier and its constituent systems.

As a writer for NPS collaborating with FIIS staff to produce outreach materials about science related to the wilderness breach, I experienced directly the tensions that emerge when negotiating the advantages and risks of metaphors used to establish persuasive and stable understandings of complex systems. For example, an NPS co-writer corrected me for referring to a salt marsh as "suffering," even though in the same piece I had referred, without any rebuke from my reviewers, to the "health" of salt marshes, natural resources, and coastal parks. Also, salt marshes that are

threatened by sea level rise are often said, by scientists, to be faced with the threat of "drowning." While referring to the "health" of an ecosystem aligns with park science and the effort to monitor "vital signs," it, too, has its shortcomings. Describing a barrier island as "living" or "healthy" may get at some of the dynamism of the system (assuming audiences are mapping the metaphor to an inherent dynamism of their own bodies and health). It also opens the possibility for interventions that align with a temporal scale familiar to and accessible to humans but that are mismatched with a temporal scale that makes sense for an island.

Similarly, a metaphor of barrier dunes as "lines of defense" may reflect the buffering, protective benefits that the barrier island provides against storm surge, but this figure of speech gives too easily to the supposition that an expedient mechanical intervention to rebuild the "line of defense" can make the structure stronger. Lastly, an understanding of salt marshes as vulnerable in their encounters with minute changes in water level overlooks their dependence on the movement of massive amounts of sediment across an island through overwash events, and belies the vast and powerful ripple effects that a vital salt marsh produces across multiple connected ecosystems, biological communities, and non-living natural resources that people depend on, like clean water.

In their management of the wilderness breach, FIIS park managers have had to chip away at oversimplifications of barrier breaches as losses, gaps, or deficits. Park managers and public information officers did not immediately characterize the breach as a deficit of sediment that needed to be repaired and filled, nor did they see the breach as an irrefutable vulnerability or danger to the south shore of Long Island. They

understood the breach as an ecological disturbance, a change that cannot objectively or accurately be regarded as either simply positive or negative.

In keeping with the legislation that guides the management of the wilderness, park managers took stock of the conditions of the breach, considered available data, and started collecting new data on the breach in order, eventually, to make an informed decision about its potential impacts. In their public communications, they noted that sometimes barrier island breaches close independently of any human intervention. They attempted to inform diverse stakeholders about how a variety of natural sediment transport processes occurring in tandem can deliver sand through a breach until, eventually, the gap is filled (Williams & Foley, 2007; Tanski, 2012).

Notably, even this assertion—grounded as it is in contingencies—elicits tension among park staff who are responsible for writing and circulating key public information messages. In the fall of 2016, I collaborated with the park's public information officer to write a pair of two-page resource briefs. (Refer to Appendix I for the final, published versions of these briefs.) The purpose of the briefs was to synthesize information contained in a 184-page draft Environmental Impact Statement, which was being prepared for public comment. During the writing process, I exchanged numerous drafts of the briefs with the public information officer, and she shared them with park managers and scientists for their review. At one point, early on, she warned me against referring to breaches as "temporary." This would be risky, she said, because "temporary" in most people's imaginations does not jibe with "temporary" on an ecological or geomorphological scale. Very shortly thereafter, she backpedaled, choosing the following language to describe a former, mechanically

reinforced and maintained inlet that, until it was abandoned, existed in the same location as the wilderness breach: "Old Inlet gradually closed through natural sediment transport processes, *as all breaches do*."

When it comes to shorelines, their dynamic fluctuations, and the complex consequences that shoreline change exerts on surrounding coastal ecosystems, uncertainty reigns. And uncertainty is sometimes more than developed coastal communities can bear, especially (and understandably) after a storm as devastating as Hurricane Sandy. In situations where scientific information must be brought to bear on issues that affect diverse stakeholder groups and publics, banking models of education and container models of the mind are inadequate to the task of taking stock of and negotiating dynamic rhetorical ecologies. And banking models of education and container models of the mind are consistent with the efficiencies of a technocratic model of science communication to which policymakers, scientists, and resource managers alike sometimes resort. On the other hand, rhetorical or contextual models of science communication enable dynamic engagement with diverse public audiences by acknowledging "the complex interrelations between scientific data, cultural and local knowledge, social and ethical issues, and other forms of data needed to make policy" (Endres, 2009, p. 67). Such an acknowledgement is important because, whether acknowledged or overlooked, these "interrelations" are already constitutive of rhetorical ecologies, of human attunement with natural systems, of the material engagements of humans with natural systems, and of the changing material conditions of natural systems.

Within days of Hurricane Sandy, a sustained public outcry erupted over the wilderness breach. People who experienced flooding on their properties on the south shore of Long Island argued that the breach caused the increase in flooding, and they insisted that it should be mechanically closed without delay. Still, park managers followed the BCP protocols for wilderness management and held off on intervening in order to conduct research that would, ideally, produce empirical evidence that would clarify, to some extent, the breach's measurable physical and ecological impacts, model possible future impacts, including whether and to what extent it could contribute to water level rise and increased flooding on the south shore of Long Island.

In October 2016, NPS released a draft Environmental Impact Statement (EIS), a technical report conveying the preliminary (p. 7) findings of breach studies and three possible "alternatives for management" (p. 21), or possible actions to be taken in response to the wilderness breach. The report represented a four-year process of assessing breach impacts. Released in advance of a 45-day public comment period, it addressed one of the most frequently cited articulations of public concern that I heard from FIIS interpretive staff related to the breach—that is, the concern over the potential for the breach to cause increased flooding in nearby developed communities.

This issue had continued to circulate for four years, showing up in park interpreters' day-to-day interactions with park visitors, with participants in public meetings, in conversations with the local media, and beyond. In a nod to this concern, the EIS identified the dredging of the mechanically maintained inlet on the far western point of the island, Fire Island Inlet, as well as sea level rise, and increased precipitation associated with climate change as factors significantly more influential

than the wilderness breach in contributing to water level rise in Great South Bay and in producing flood risk on the Long Island south shore (National Park Service [NPS], 2016, pp. 40, 41). In other words, every single one of the drivers of flooding suggested in the text of the EIS pointed to human impacts as the possible causes of flooding, and not to the natural disaster or "Act of God" that was Hurricane Sandy and the storm-formed breaches.

The BCP and the wilderness breach EIS, as well as the resource briefs that I helped to write, shape discourse about and perceptions of barrier breaches at FIIS, and they constitute discourse that shapes the very landscape. They also represent and further influence how park staff communicate about natural resources and natural resource management in the park, and they exact consequences for the relationships between public audiences and those with the authority and expertise to compose and interpret these foundational technical documents.

Theoretical orientations toward ecologies of writing and rhetorical ecologies show how analyses of rhetorical contexts cannot be reduced to static models that isolate a writer or rhetor, her exigence for writing, her particular audience(s), and her stated purpose. Cooper argues,

> An ecology of writing encompasses much more than the individual writer and her immediate context. An ecologist explores how writers interact to form systems: all the characteristics of any individual writer or piece of writing both determine and are determined by the characteristics of all the other writers and writings in the systems. An important characteristic of ecological systems is that they are inherently dynamic; though their structures and contents can be

> specified at a given moment, in real time they are constantly changing, limited only by the parameters that are themselves subject to change over longer spans of time. (Cooper, 1986, p. 368)

Edbauer (2005), too, has shown how within rhetorical ecologies, language and symbols circulate in unpredictable ways, and as they do, they get adopted, riffed on and re-appropriated; they accrue new meanings through dynamic materiality, "dimension[s] of movement", and "affective channels" that are overlooked in relatively static models of rhetorical situation (Edbauer, 2005, pp. 20–21). The point that I want to make here is that rhetorical ecologies disrupt static meaning, in practical, lived, applied ways, and rhetorical ecologies challenge static notions of how rhetoric plays out with and within material realities.

Rhetorical Ecologies as a Frame for Understanding the Limits of Technocratic Models

The content of the BCP, of the EIS, of the wilderness breach resource briefs, of park interpretive programs, and of park rangers' conversations with visitors to FIIS are not stable or static rhetorical constructs that enable a rhetor (park managers or park staff, for instance) to deliver discrete messages (scientific knowledge and facts about breaches) to particular audiences (the public, park visitors). That being said, these are nevertheless texts that matter to the management of the material and rhetorical-ecological landscape at Fire Island National Seashore and in surrounding communities.

These documents elevate scientific data and analysis and existing policy as the only available authoritative content for public information and deliberative discourse. The underlying assumption of these texts is that they adequately fill a gap of missing technical information, allowing people to make informed decisions. This view of their purpose is consistent with a static model of rhetorical situation and overlooks the "fluidity" of rhetorical ecologies and the possibility for public rhetorics to morph and move "in the radius of their neighboring events" (Edbauer, 2005, p. 20). It is also consistent with a deficit model of public understanding of science, and with a technocratic model of public participation (Gross, 1994; Endres, 2009).

Admittedly, my own experiences of writing resource briefs were grounded in and directed by some of these assumptions. The wilderness breach resource briefs I co-wrote were meant to synthesize scientific information contained in the wilderness breach EIS for diverse public audiences, to celebrate the fact that resource management decisions are authorized by science, to persuade audiences of the value of park science for directing correct management action, to translate technical details into pithy, public-friendly language, and to reinforce the claims of park science to authority, objectivity, and applicability—all in a few hundred words. Each wilderness breach resource brief contained a vague announcement of the public comment period and public meeting to come. However, because of some logistical constraints attendant upon a genuinely tight timeline for releasing and announcing the draft EIS and the associated public comment period, the briefs neither identified the starting and ending dates of the public comment period, nor did they indicate the date, time, or place of the

public meeting at which concerned citizens could show up to engage directly with park managers, ask questions, and add comments to the public record.

As Endres (2009) has shown, processes for public discourse and engagement about science-based issues that abide a technocratic model are ostensibly designed to elicit the participation of public stakeholders in science-based decision-making but are driven by a motive "to educate the public instead of considering their feedback" (p. 63). Such processes tend to marginalize perspectives that do not directly refer to and affirm technical data or analyses presented and synthesized by sanctioned experts (Endres, 2009, p. 66). Endres's (2009) findings also reveal, in part, how technocratic approaches to public participation in science-based decision-making enable authorities and experts to maintain the illusion of accountability even as they conceal a certain degree of dismissiveness toward participants' concerns (p. 67). Some scholars further argue that technocratic systems of public communication of science are designed, ostensibly, to cultivate participation, but that are in fact ruses. Endres (2009) refers to this phenomenon as "a guise of deliberation" (p. 67), and others have referred to such strategies as "staged." In one article which was uploaded to the "21st Century Engagement" site that NPS interpretive staff use as a professional resource, Borchelt and Hudson (2008) argue:

> Research organizations have been quite adept at putting together well-researched, tightly scripted opportunities for "public input"—but with no institutionalized mechanisms for reflecting the public's input in deliberation or policy construction. In fact, one gets the not-so-subtle impression that these engagement events are being held with the hope of staving off public

> dissatisfaction, or providing just enough semblance of listening to public concerns that the natives don't get so restless they revolt. (para. 10)

Included among the events and affective channels that might be considered an interdependent part of the "neighboring events" within the rhetorical ecologies of science communication at FIIS are: the destruction of homes during Hurricane Sandy, the feeling of confidence that property owners on Fire Island and on the south shore of Long Island have for academic and government research, their perceptions of the gains of long-term biophysical research as weighed against the immediate needs of people living on the coast as annual storm seasons approach. Under conditions of uncertainty, when people have lost their homes, coming by faith in a science that is put forth as autonomous of these "neighboring events" is a challenge.

Notably, several scientists and park interpretive rangers did seem to observe, indirectly, how rhetorical ecologies shape possibilities for productive public engagement with natural resources science and decision-making. Dr. Sands (whose perspectives I described in chapter two) and several other researchers in the park explained to me how Hurricane Sandy—the natural disturbance itself—was an experiment that nature ran. The post-storm recovery and mitigation funding enabled researchers to examine its impacts, even as many thousands of people living on the coast struggled to rebuild their homes and lives. Off-the-record or in informal conversations, and in candid terms not reflected in their public texts, scientist and park staff articulated to me the difficulty of living with and communicating through the tensions that emerged from this paradox, from these complicated realities, beginning with the fact that Hurricane Sandy cannot be understood simply as a destructive force.

It is possible that, in some instances, tensions simmered and relationships ruptured as property owners perceived the breach as a "loss" while scientists recognized it as a gain for scientific study and for the long-term evolution of the barrier island and its ecosystems.

This tension is not ameliorated any by the significant uncertainties that attend scientific findings. Communities and resource managers must always inevitably make decisions under conditions of uncertainty, and the EIS explicitly acknowledges that there are scientific unknowns, and that a degree of uncertainty about long-term change to the breach, the barrier, and affected ecological resources persist within and across most of the available technical information (NPS, 2016, pp. 7, 42, 49, 54, 57, 59, 61, 80–82, 95, 103, 106). The public information officer with whom I collaborated in writing the wilderness breach resource briefs also stressed the importance of acknowledging the uncertainties and unknowns that persist about the breach. However, during the public outreach breach hike that took place during the April 2016 Fire Island Science Conference, this ethical appeal failed some of the speakers who were, at times, abrupt and emphatic about the benefits of the wilderness breach and the swiftness with which those benefits would be lost if it were to be closed.

In the same way that the language of "filling" a breach is not adequate to the task of representing the dynamic character of shorelines, a technocratic model of science communication is not up to the task of confronting and negotiating productively the complex and dynamic rhetorical ecologies of science-based decision-making in public lands. Public audiences are not containers to be filled, nor are they ignorant, or passive. As Blythe, Grabill, and Riley (2008) have shown, even when

public engagement is not cynically orchestrated to limit public participation, the best-intentioned efforts of scientists (or park managers or park interpretive rangers) to deliver information and provide opportunities for open exchange can fall short of the needs of people who have a stake in the decisions of those who also have the authority to orchestrate public outreach events (Blythe, Grabill, & Riley, 2008, p. 287–288, 295).

Deepening a Migrating Channel

The Wilderness Breach as a Driver of Barrier Integrity and as Rhetorical Exigence for Dialogue

In an open letter issued five months after Hurricane Sandy, a group of coastal scientists substantiated and reinforced the position of park managers when they urged local stakeholders to reconsider their understandings of what this barrier breach in the wilderness might mean for critical ecosystems, for the integrity of the island's structure, and for the resilience of communities on the south shore of Long Island to endure future storms and sea level rise (Young et al., 2013).

While those who see the barrier as a "line of defense" that was "lost" during the storm are interested in the "filling" or the closure of the breach, the National Park Service is concerned explicitly with the *integrity* of Fire Island. In a technical report on breach management in the Otis Pike Fire Island High Dune wilderness issued by the Northeast Region of the National Park Service, Williams and Foley (2007) write,

> The Fire Island barrier islands, a sand-starved system dominated by highly dynamic processes, are struggling to maintain their integrity in the face of sea-

> level rise and storms. Adding to the dilemma is that development on the barriers and the mainland has increased greatly during the past 50 years. As such, managers and decision makers in federal agencies, state agencies and local governments are challenged to balance tradeoffs between protection of lives and property, public access and long term conservation of natural habitats and processes and the plants and animals that depend on these habitats. (p. 2)

This articulation of "tradeoffs" hints at some of the many varied drivers of change in natural systems and of the exigencies around management decisions and science communication practice. Fire Island is subject to dynamic processes within a broader system of embedded, overlapping, interdependent, and sometimes competing ecological dimensions that include non-human and human, living and non-living, biological and geological, structural and atmospheric, economic and cultural, social and discursive drivers of change. Integrity, resilience, disturbance, wilderness, and shoreline dynamics: these terms are constitutive of the rhetoric of coastal resource management at FIIS. They are formative concepts by which natural resources in this context are known, understood, valued, and managed, and they are operative terms by which resource managers orient policy decisions. Sometimes they are used in technical ways, but the resonances of these terms morph across different rhetorical contexts.

The wilderness breach, as a rhetorical exigence, calls for invoking the policies represented in the BCP, for consulting with the data and analyses of long-term monitoring research, for articulating the urgency among legislators to release funding for resilience research projects in coastal public lands, for designing and launching

resilience research, for hosting researchers from a variety of institutions in the region as they set out into the field, for instituting regular flyovers to shoot aerial photography of the ever-evolving, shape-shifting breach, and more. The wilderness breach also easily occupies a rhetorical place as exigence for dialogic science communication at FIIS.

FIIS park interpretive staff draw upon multiple strategies for communicating with and educating people about important science-based issues in this coastal park. To do their work, park interpreters generate meaningful connections between park resources and visitors' values and experiences in order to translate the significance of historic sites, cultural artifacts, and structural and natural resources. Embedded in the definition of interpretation are a couple of key assumptions: that park visitors' values and experiences shape interpretation, and that park interpretive staff are engaged in analysis and translation—or accommodation—of specialized fields of inquiry for dynamic and diverse but relatively non-expert audiences (Gross, 1994; Fahnestock, 1986).

When I first visited FIIS, there seemed to be a dominant perception among park managers and park interpretive staff that people arguing for the closure of the wilderness breach were misinformed and failing to grasp how the facts of the case warrant restraint—restraint, that is, from intervening too hastily to "fill" or to fix the wilderness breach. For a full four years following Hurricane Sandy, park interpretive staff at FIIS were engaged in learning about and disseminating information about the science behind shoreline dynamics and the monitoring of the wilderness breach. Many

of the interpretive rangers I talked with see themselves as professionals who do their part to fill a knowledge gap among park visitors. Indeed, some park interpretive rangers believe that park visitors expect them to be, basically, surrogate experts. Concerted efforts to challenge this perception are, so far, met with mixed results.

In a summer interpretive training at FIIS that included experienced rangers, volunteers, and new seasonal staff, an NPS trainer, Alan Lakeview, taught participants how to use facilitated dialogue as an alternative to more traditional approaches to interpretation. Alan introduced facilitated dialogue as a method that "uses a strategically designed set of questions . . . to guide participants into a structured, meaningful, audience-centered conversation about a challenging or controversial topic." Facilitated dialogue, we learned from Alan, de-centers authority, promotes engagement, empowers visitors, and moves away from the "one-way" dissemination of information to engage multiple viewpoints. It positions visitors to "generat[e] the discussion amongst each other with the ranger." It reflects a view of visitors "as a resource to themselves, each other, and to the park," and it represents "a way of thinking. It's not simply a delivery mechanism." (Refer to Appendix II for official NPS documents describing facilitated dialogue and for sample handouts and worksheets used at this training.)

Alan connected interpretive practices like facilitated dialogue to digital culture, noting that park interpretation is changing from a traditional walk-and-talk model to one in which "control is being shared amongst everyone involved, including learners, and we're seeing content coming in, not just from one person, from one source, but

from many different sources contributing at the same time." Significantly, he also introduced facilitated dialogue as a method that is responsive to one of three goals of "21st Century Interpretation in the National Park Service," specifically, the goal "To support global citizens to build a just society through engagement with natural and cultural heritage."

When Alan presented a slide with this latter quote to participants in the training, the group responded with murmurs and hoots of surprise. This goal sounded to them perhaps beyond the scope of their job descriptions. Alan confessed that when he first read this goal, his reaction was, "Whoa! I'm like, 'That's my job?!'" Facilitated dialogue, he pointed out, challenges traditional interpretive methods—it challenges what one study calls the "fixed and fearful" style of interpretation, a style that was immediately familiar to those participating in the training. They summed up the difference between facilitated dialogue and the "fixed and fearful" style of interpretation as basically equivalent to the difference between an interpreter playing the role of "guide on the side" or the role of "walking encyclopedia." Not incidentally, the "fixed and fearful" style of interpretation was recognizable to me, too, as a teacher of writing, since it resembles a current-traditional pedagogical style.

Alan provoked a discussion. He asked participants to reconsider the traditional role of interpretive rangers as people who deliver content. He invited them to imagine, instead, what the new role for interpretive professionals as people who facilitate engagement might mean for their daily interpretive practice. Seasoned rangers and new rangers-in-training alike expressed reservations and objections to this approach.

They were especially reluctant to engage park visitors in conversations about "controversial issues," like climate change.

Alan asked participants to explain the reasons why the shift from the traditional style is difficult and met, sometimes, with resistance. Here is a snapshot of that conversation:

Alan: Why do you think we've tended to default to the more didactic style of interpretation?

Ranger 1: It's the way we learned.

Ranger 2: It's easier to control.

Ranger 3: We have all the answers.

Alan: It's hard, especially when we're dealing with controversial issues—it can feel threatening.

Later, Alan added, "I think our leadership right now in the National Park Service . . . sees the National Parks as a place where democracy can thrive and where we can engage people as citizens in dialogue about important issues." He urged interpretive staff to relinquish a little bit of control and to see park visitors, themselves, "as a resource to themselves, each other, and to the park."

In a subsequent interview, one new member of the park interpretive staff, Padraig, pointed out that when he goes to National Park sites as a visitor, he prefers hearing the ranger who is a walking encyclopedia. He also worried that the open-ended questions that interpretive rangers are expected to craft in order to facilitate

dialogic engagement might come across as "fluffy and childish almost," and he asserted,

> We still *are* a source of knowledge and encyclopedic information to as much of a degree as we can be. So, I think that having a mix of open-ended and fact-based [questions] is more of a way to respect the intelligence of the people we're speaking to.

Later, Padraig told me,

> When I started as a park ranger, I already had an idea in my head of what a park ranger should be like and how they should speak. That was to be very, very knowledgeable on the topics, on almost any topic that could possibly come into play.

Outside of his role as a park ranger, Padraig is also an emergency medical technician, and he draws an association between his attitudes toward each of these roles. He says,

> As an EMT, when you go to a scene, everyone there is expecting you to know what you're doing and to immediately take care of whatever's happening. And I really take that to heart because I know what it's like to want an expert and to need the expert. So I do whatever I can to know everything I can, and then as soon as I get there, I'm ready to give them whatever they need, and . . . the more someone needs of me, the more I will give. . . . Maybe without even meaning to, I found that I have a similar mindset as a park ranger. Not that I'm ever in an emergency situation there—it's a much different situation. But when I'm talking and giving a tour, and [someone asks a question], I identify them as

a person that needs a certain kind of thing, and I do whatever I can to give as much of that as I can.

Padraig frames his role in the park as a service-provider, and in his account, visitors are dependent upon him for knowledge. Much in the same way that the Army Corps of Engineers dredged, moved, and deposited sediment to "fill" one of the two breaches at FIIS following Hurricane Sandy, Padraig sees his role as an interpretive ranger as one who dredges, moves, and deposits information. As a surrogate expert, he believes it is his responsibility to deliver content from experts to non-experts, as part of a one-way transaction.

There seems to be a potentially productive tension between views of park interpretation that posit interpretive rangers as surrogate experts and ongoing efforts among FIIS interpretive staff to transform park interpretation to be more engaged. In the context of the new vision for park interpretation, facilitated dialogue figures prominently as a scalable model for meaningful interaction in park sites, and yet, for interpretive staff who identify as surrogate experts, their new roles as facilitators do not necessarily come naturally.

When interpretive rangers assume a role as surrogate experts, it is as if they are "standing in" for the experts, the scientists doing research in the park, in order to shepherd scientific information to public audiences. In one sense, this view seems to sustain a technocratic model of communication by setting interpretive rangers in a position that blocks off the possibility or likelihood for interpreters to play a disruptive, engaging role in science communication.

In another sense, interpretive park rangers have a degree of expertise about ecological science, geology, coastal geomorphology, oceanography, marine biology, and/or other sciences, as well as environmental history, enough to be prepared to translate accurate scientific information clearly and concisely for other members of the park staff, policymakers, members of the media, recreational visitors to the park, people who reside within or near the park site, own property or businesses in close proximity to the park site, or who are connected with the park site for personal, cultural, or recreational reasons. I met volunteers and seasonal rangers who came by this knowledge over decades of interpretive practice in the park, and I also spent time with new seasonal rangers who came by this knowledge as part of their studies in universities. Because the audience for park interpretation is so broad and diverse, interpretive rangers also possess local, social, cultural, and rhetorical knowledge that is necessary for and constitutive of their professional specialty. Combined, these two kinds of expertise enable them to interact in productive ways with diverse, non-specialist audiences, who are stakeholders in, and who participate in science-based decision-making about natural resources in the park site.

Boundary-crossing expertise such as this is what Collins and Evans (2002) refer to as "interactional expertise" (p. 254). While Collins and Evans aim to describe the possibilities for sociologists of scientific knowledge to acquire expertise in scientific specializations, I see their classification of expertise as useful and adaptable to this different situated context involving interpretation and public science communication. I will explain first what interactional expertise is not. Collins and Evans (2002) set interactional expertise apart from "contributory expertise," the latter

of which is “enough expertise to contribute to the science of the field being analyzed,” for example, the kind of expertise that is required for peer-reviewed publication in a specialized field (p. 254). They also set interactional expertise apart and from “no expertise” (Collins & Evans, 2002, p. 254). Interactional expertise is “enough expertise to interact interestingly” with those who have contributory expertise, basically, with those who are highly specialized experts who are positioned to contribute research that advances their field (Collins & Evans, 2002, p. 254).

Most notably, interactional expertise is required for translation “between different social worlds” (Collins & Evans, 2002, pp. 257–258). The interactional expertise of both social worlds would be required, for example, for translating information between those who have contributory expertise in specialized fields of science, and those who have different types of contributory expertise, whether scientists from another field or people who possess local, practical knowledges. In the context of resource management, in which scientific findings about natural ecologies as well as social action and rhetorical ecologies have bearing on policy, local knowledges that come into play may include knowledges relating to local cultures, politics, and economies, including for instance the perspectives and observations of fishers, farmers, oyster cultivators, activists, and homeowners (Collins & Evans, 2002, pp. 255–256).

When it comes to science-based decision-making and science education at FIIS, interpretive park rangers are precisely the people who, as a defining characteristic of their profession, are called upon to acquire interactional expertise across social worlds so that they can provide translations that matter in the context of

the management and stewardship of natural resources. The perception of interpretive rangers as surrogate experts is inadequate to account for the interactional expertise that they mobilize as part of their daily professional practices of interpretation, practices that could enable information to flow in more than one direction, as part of a potentially reciprocal dialogue, which in turn might contribute to building relationships of trust between park scientists and coastal communities.

Interpretation is fluid. It shifts and takes shape in situated, particular interactions. Even those interpretive rangers who prioritize the one-way delivery of content, who see themselves as surrogate experts, and who assume that park visitors represent a passive audience, still believe that interpretation must be, in practice, tailored to contingencies such as material conditions and audience expectations and contributions. They are sensitive to rhetorical ecologies in ways that other science communication practices related to science-based decision-making are not, and they have more flexibility to adapt their interpretive practices to the fluidity of these rhetorical ecologies, in large part because they possess and continually develop interactional expertise that enables translation across diverse social worlds.

Moving Toward Engagement, Participatory Inquiry, Play, and Risk

Particularly important to any analysis of the rhetorical ecologies relevant to policy decisions about the FIIS wilderness breach is an acknowledgement of how power relations and technocratic forms of communication figure in decision-making, public information, outreach, and interpretation. Arnold, Koro-Ljungberg, and Bartels (2012) assert that such recognition matters for all stakeholders—policymakers,

experts, resource managers, and private citizens alike—involved in resource management decisions. They write,

> Resilience in complex social-ecological systems requires negotiation among diverse "knowers" and "actors," not simply reliance on expert solutions. Thus, we encourage leaders and participants of adaptive management to become more aware of the value of dialogue to challenge problematic power relations and enhance collaborative learning and adaptive decision making. (Arnold et al., 2012, Conclusion, para. 3)

One failure of a technocratic approach to science communication in this context would be its inherent evasion, marginalization, or exclusion of the beliefs, attitudes, values, and knowledge that public stakeholders bring to bear on a problem. Hurricane Sandy generally, and the wilderness breach especially, motivated FIIS staff to transform their approaches to park interpretation, and this transformation included valuing dialogue through new, engaged interpretation methods, as well as making interpretation a more collaborative experience of meaning-making for visitors to the park and participants in park programs. This change is consequential for Fire Island communities, for communities on the south shore of Long Island, for the vitality and stability of Great South Bay ecosystems and for the wilderness as park managers consider the available scientific information, consult with citizens, evaluate their choices for responding to the wilderness breach, and make resource management decisions.

Giving dialogue more value than static "talking points" in park interpretive programming disrupted and displaced control over the message—the content—of

science communication in the park. Such a change in interpretation practices provoked recognition among park staff of the possible consequences of new kinds of engagement, including the possibility that, to a heightened degree, they would find themselves confronted with the rhetorical challenge of communicating with and through polysemy (Druschke, "Agonistic," n.d.), getting entangled with the diverse meanings, values, and purposes emerging and circulating around specialized terms and concepts like "wilderness" "integrity," "resilience," "disturbance," and even "climate change." They would find themselves on the front lines of "negotiation[s] among diverse 'knowers' and 'actors'" some of whom resist "expert solutions" (Arnold et al., 2012, Conclusion, para. 3). Park interpretive rangers described a shift—heightened following Hurricane Sandy—from a focus on educating park visitors about essential topics and delivering prepared interpretive content about barrier island migration and shoreline dynamics to, instead listening to, responding on the fly to, and living with the tensions at play among counter-perspectives on what a barrier island is, how it is valued, and on the necessity for dynamic systems to support the not-so-dynamic equilibrium of human coastal communities.

The different rhetorical practices of park scientists and park staff offer a material, ecological, discursive analogue for broader questions about rhetorics of science communication and public engagement. When scientists and park managers urged the public and policymakers not to foreclose prematurely on a technological solution to the wilderness breach, to see the dynamic behavior of barrier islands as generative and not threatening, and to recognize the wilderness breach as part of a built-in process that reinforces resiliency and not as a structural vulnerability

(McGreavy, 2016), they were asking for people to attune differently to this system (Druschke & Rai, n.d., p. 2; Rickert, 2013, pp. 220–223). Such an attunement would also require a reconciliation of discursive tensions, of incommensurate rhetorics—or perhaps more productive, the recognition of irreconcilable entanglements—and a reconfigured form of engagement between those communicating science through a technocratic, deficit model and the diverse public audiences understood as the non-expert, passive targets of a deficit model.

A technocratic rhetoric, for example, seeks to foreclose swiftly on pre-ordained solutions—solutions informed by and ordained by experts prior to informing non-expert audiences—and evade the potential for complex engagement with publics who, it is supposed, must concede once they have been supplied with basic information (Endres, 2009, p. 56; Gross, 1994). A rhetoric of environmental communication that centralizes authority, that is shaped by experts who are reluctant to cede control, that is characterized by asymmetrical relations and shaky trust between scientists and public stakeholders, or that is characterized by a compulsion for stability and control, resists and is threatened by the generative dynamism of rhetorics that de-center authority and engage diverse ways of knowing, valuing, and attuning to the complex ecologies of the natural world (Gross, 1994; Endres, 2009, p. 51–52).

Crick and Gabriel (2010) assert that "scientists and citizens are—potentially at least—actors within a shared scene in which not only beliefs but attitudes, values, conventions, relationships, emotions, aspirations, and sensations are motivating factors" for social action in the context of "everyday lifeworld disruptions" (p. 208, 215). Rhetorics that mobilize social, cultural, ethical, aesthetic, affective, or embodied

dimensions of public scientific controversy (Endres, 2009; Crick & Gabriel, 2010, p. 208); that recognize and contribute to the ecological-rhetorical "movement" and "trans-situationality" (Edbauer, 2005, p. 20) of the commonplaces of a public scientific controversy; that invite "noise," unexpected disturbances, frictions, tensions, agonistic rhetorics, dissensus, and traditionally excluded or marginalized perspectives (Boquet, 2002, p. 51–52; Druschke, "Agonistic," n.d.; Trimbur, 1989) into scenes of crisis can seem—in situations where the impulse to deploy technocratic rhetorics persists—threatening, destabilizing, as a source of vulnerability, rather than as a process and a form of engagement that can enhance resiliency.

Park interpretive staff at FIIS came face-to-face with the public scientific controversy of the breach in their efforts to deliver information—technical content—while also engaging with people who lost their homes and livelihoods as a result of Hurricane Sandy. Daily, they experienced the tensions emerging from a one-way mode of content delivery in a context too dynamic to contain and stabilize content and public discourse. While a technocratic model of public understanding of science essentially positions the non-expert public as an obstacle that can be dealt with strategically and efficiently in order to secure a stable consensus around scientific decision-making, Crick and Gabriel (2010) assert, "The problem of the public is not just a deficit in knowledge or the impact of distorted communication; it is also the corruption of a lifeworld capable of bringing people's lives into meaningful relationship with one another in a shared world" (Crick & Gabriel, 2010, p. 220–221). Dynamic engagement through public participation in science-based decision-making can bring people's lives into meaningful relationship with one another in a shared

world by attending to and attuning with the dynamic interdependence of biological, physical, material, embodied, discursive, human and non-human, living and non-living dimensions of rhetorical ecologies.

The different approaches to the management of breaches on Fire Island, both within and outside of the wilderness, are material manifestations of the different communication and interpretive strategies used by scientists in the park site, FIIS park managers, and interpretive staff. The underlying assumptions and attitudes associated with the practice of filling breaches in an orderly, expeditious fashion (as the Army Corps of Engineers [ACE] did in locations outside of the wilderness area) contrasts meaningfully with the preference among park managers (reflected in the BCP mandate and wilderness policy) to monitor the dynamic work of breaches in order to learn how they might be filled by natural processes—a process of attending to and attuning with the environment as a form of engagement and intervention. By taking into account the value of breaches to move sediment and enhance the resilience of the island, this latter approach enables exploration and inquiry, albeit with less certainty. It accepts the possibility—and the risks, to some extent—for unpredictable outcomes. Together, these two different approaches toward managing breaches suggest a potentially rich comparison between two different strategies for park interpretation, one of which prioritizes the delivery of content to non-expert publics, and the other of which prioritizes playful, dynamic engagement with diverse publics.

The move toward park interpretation that positions interpretive rangers as facilitators opens the possibility for interpretive rangers to own their interactional expertise, to intervene in and challenge the traditional technocratic approach of

science communication, to get beyond the one-way delivery of content, to allow new kinds of movement in the flow of information and knowledge, and to empower traditionally marginalized, diverse perspectives and knowledge that have a bearing on the resilience of coastal communities and natural resources. Engaged, participatory methods of interpretation that park staff are currently developing and testing have the potential to position interpretive staff as the creators of a new science communication paradigm for the National Park Service, one which creates new patterns of knowledge-circulation—perhaps a more upstream pattern—by virtue of playful, dynamic engagement within the park site.

CHAPTER 4

An Impossibly Tight Weave:
Evolving Ethnographic Methods for Rhetorical Field Studies

La géométrie trompe; l'ouragan seul est vrai.

– Victor Hugo

On a sunny, hot August day in Watch Hill at Fire Island National Seashore, I shoved my audio recorder, notebook, pen, and camera into a dry bag, pressed it against a rise in the sand, and lunged into the water to help a child drag a seine net about the length of a minibus along the southern shoreline of Great South Bay. On the beach, a crowd of adults took pictures, but when the park ranger had called for volunteers, the grownups had hesitated. I was one of them, too occupied with note-taking to step up, until the park ranger, a participant in my research, called on me. With my equipment secured and safe from the water and sand, I teamed up with a child on one side of the net, and the park ranger leading this "Catch of the Day" program assisted another child on the other side.

I was startled, as we dragged the net through somewhat murky water, to feel its weight, to discover how much tension the net amassed, how much drag the weights along the bottom edge produced as we hauled it along the sediment on the bay bottom. The net curved back behind us. It felt as if it was twice my own weight. The ranger called out instructions to make a scooping motion to prevent the net from flipping and

depositing our catch back into the water. I pressed all my body weight into the dowel attached to the narrow end of the net and barely managed to keep the bottom of the net from flipping. At last, when it was settled flat on the beach sand, we kneeled to inspect the catch. The adults and other children waiting along the beach scurried toward the net, too. Scattered along its length were tiny finfish, a few crabs, seaweed—nothing a person could make a feast of, not that that was the point. I was surprised and a bit perplexed and disappointed that the instrument itself—its length, its shape, its intricate webbing, and of course, the weights attached to it—had produced considerably more friction and drag than the sum of the organic material that we collected.

This interpretive activity meant to introduce people to the marine life of Great South Bay offers a salient analogy for methodology. Qualitative methodologies involve procedures and instruments that produce substantial tensions, complex interactions, relationships, conflicts, and unruly paradoxes, thus introducing the potential for instruments and procedures to overburden qualitative data. Among these, the researcher-as-instrument may be, arguably, the most cumbersome.

Right around the time that I was dragging the net through Great South Bay, observing how engaged children were in this playful, exploratory activity, and how the adults who accompanied them to the shoreline voluntarily assumed a peripheral role in the activity; right around the time when I was actively struggling with my own responsibilities as a researcher—when I was tangling with questions about whether I was failing in my responsibilities if I put my notebook and recorder aside, or alternatively, if I would undermine my own methodological commitments if I chose to take notes rather than get in the water and practice seining—I started to sense an

overflow of troubling tensions in my research, many of which I was afraid of, in denial of, or not yet capable of articulating. Some of these tensions I would need to address or reconcile. Some had to do with my own expectations of the research. Some were not unlike the mismatch between the pressure that I had felt on the seine net when it was underwater, and my perceptions about the substance and consequentiality of the catch once I saw it laid bare on the beach.

When I first set out to study education, outreach, and public information activities at FIIS, with a focus toward examining how FIIS staff use play as a strategy for teaching, my research was taking shape, first and foremost as an inquiry about play and teaching. Before long, however, other practical concerns, theoretical lenses, and situated practices rose to the surface and vied for prominence, not with the rocking force of something that blindsided me, but rather, with a gradual, emerging sense that something, I knew not what, was causing friction. As a researcher, embedded in a field site, immersed in writing practices with and alongside my research participants, it was dawning on me that my initial assumptions needed adjustment. I had developed a tidy plan to articulate what this research could accomplish, what it would bring into focus—and how—and what it should reveal. Tidiness, however, is virtually anathema to qualitative research, and in keeping with this assumption, the tensions that I encountered exceeded the simple fact of, say, an unconfirmed hypothesis.

It is well-established, particularly in ethnographic research, that tensions emerging from the research site, from the participant-observer's negotiation of positioning, power, and subjectivity in relation to research participants and institutions, and from the sometimes-incompatible needs of the researcher and

participants, shape procedures, scope of inquiry, research findings, and methodologies (Blythe, Grabill, & Riley, 2008; Cintron, 1997; Dautermann, 1996; Druschke, "Agonistic," n.d.; Herndl, 2000; Herndl & Wilson, 2007; Rai & Druschke, n.d.; Reynolds, 2004; Sullivan & Porter, 1997). With this chapter, I will discuss the productive tensions that emerged within my own research, and I will connect the emergent methodological issues of my research with ongoing conversations about rhetorical field methods, autoethnography, and post-critical scholarship in rhetoric and composition.

From a historical perspective and from an ecological perspective, too, turbulence is somewhat of a norm at Fire Island National Seashore (FIIS). Before the National Park site was established, citizens and policymakers were embroiled in debates over infrastructure development of Fire Island. In the two years before FIIS was established as a National Park site, planners proposed building a highway across the Fire Island, which, as a barrier island, is by definition a perpetually migrating sandbar. Citizens helped to secure the protection of the island from destructive development, but not without great effort and sacrifice. It took years of civic action, and the cooperation of public officials, community organizations, and citizens. One research participant, an interpretive park ranger, explained to me that her family had a modest summer home on the island before the Otis Pike wilderness area was designated as such. When the wilderness was established, her family had to give up their home to NPS. Legally, they were seen as squatters; no municipality had made their property ownership official in the first place. But in a park whose natural and

non-human communities are so intimately interconnected—that is, through proximity, shared resources, ordinary, everyday encounters, and the complex, contingent meanings of stewardship—with the ecologies of human communities and non-human structures, ecological and social turbulence has become somewhat of a norm, so much so that, according to senior park rangers, FIIS has earned the reputation as a gauntlet: if you can survive a stint as a ranger at Fire Island, you can succeed at any park.

Besides the patterns of turbulence and renewal that have characterized the history of civic action on Fire Island, the perpetual change that is characteristic of a barrier island, plus the anthropomorphic affronts to FIIS's land and underwater holdings, which comprise 75 percent of the park site, make this site one of constant transformation. As a park site situated within the region of a highly developed urban communities, FIIS exemplifies, perhaps more vividly than some of the more vast, iconic National Parks, how the establishment of a National Park site does not create a perfect division between natural environments and significant human impacts. Any such bifurcation rests on the validity of myth, reflecting the stories that we tell ourselves about efforts to protect, restore, or preserve natural environments, but not the empirical facts of natural ecologies, as can be seen in the results of deleterious anthropomorphic deeds associated with climate change, which have long been observable in National Park sites, remote wildernesses, and protected lands across the country and around the globe. More to the point, in this situated context, the complex ecological idiosyncrasies of Fire Island are bound up with the lifestyles of people who live on the densely developed north shore of Great South Bay and with that of the

people who live on Fire Island, within any of 17 geographically distinct, in-park communities which contain approximately 4,000 households.

Into this already complex, never-static, and sometimes tumultuously in-flux site, I entered as a researcher setting out to understand how park rangers, as educators and instructors in this community-based setting, integrate play into interpretive programs designed to teach park visitors about science-based issues at FIIS. My work as a researcher, rhetorician, and writer converges with this site and at the multidimensional intersections of natural, ecological, physical, social, and symbolic disturbances unfolding in this public space. My examination of park rangers' playful, engaged methods of teaching people about park science also developed out of an existing relationship with the National Park Service, through which I produce public-facing science communication materials for parks along the northeast coast of the U.S. which were impacted by Hurricane Sandy. I explain to public audiences the value of post-Hurricane Sandy studies of natural resources in coastal park sites, including studies that look at storm-wrought transformations on Fire Island. In this role, my writing overlaps with my research participants' professional writing as educators and science communicators in the park.

Through field-based ethnographic methodologies, I endeavored to inquire into the place-based, embodied, participatory, visual, and discursive rhetorics supporting science writing and science communication in the park, even as I collaborated with park rangers to write outreach materials that would shape park conversations about park science. As a participant-observer, I was simultaneously let into the park as a

guest through the negotiated permission of park managers and enmeshed in the places and practices of public information and science communication in the park.

Between September of 2014 and April of 2017, I was employed in an official capacity as a writer of NPS public outreach materials, contributing to the production of 25 resource briefs, researcher profiles, photo stories, interactive story maps, public presentations, and conference presentations. (Refer to Appendix I for sample resource briefs.) Between June and August of 2015, I also spent ten days at FIIS conducting interviews with park interpretive staff, observing their training and park interpretive programs, and collecting documents related to park interpretation and science communication. (Refer to Appendix II for sample training handouts and worksheets.) My existing relationship with the park guaranteed that my role would be as a participant-observer. I navigated insider status and outsider status in the field like any participant-observer, never fully belonging to either position, always anxious about the responsibilities incumbent upon me in both, sensing the full ambiguity, disorientation, and distortion of my positioning as both collaborator and as researcher. I navigated my roles, tenuously and uncomfortably, aware of my privileges and my indebtedness to the institutions supporting my research and the participants volunteering to take part.

In this context, I was committed to methodologies that enable emergent procedures in the interest of empowering research participants—their voices, their language, their concerns—to shape unfolding research practice and questions. I sought to produce thick description of the research site and of the events that I observed, integrating multiple voices and perspectives from the field, while also allowing for researcher reflexivity. Adapting to the kairotic exigencies of the research site itself, I

toggled between participating in the unfolding scene and conducting passive observations. While I regret the potential implications of what I am about to confess, and while I would not wish to reinforce any assumptions about the potential for positivism in ethnography, I believed that I should make some attempt at passive observation to ensure that my own participation would not, at every turn, deeply cloud every interaction that I observed. I chose this approach understanding, paradoxically, that no matter how "passive" my observations seemed in comparison with other situations in which I was deeply enmeshed and "active" in collaborative writing, training, or interpretive activities, my own participation in this research *would inevitably* color every interaction that I observed, every interview that I conducted, every text or situation that I analyzed.

In light of these conditions, I explored the possibilities and the many risks and pitfalls of autoethnographic methodology, particularly insofar as it addresses issues of researcher identity, authority, and authenticity (Reed-Danahay, 1997, p. 1). Autoethnography expands the possibilities for researcher identity and reflexivity by acknowledging radical multiplicity and fluidity of researcher roles. According to Reed-Danahay (1997), far beyond simply challenging the "'objective outsider' convention of writing common to traditional ethnography," autoethnography enables a researcher to approach her relationship with study participants and her documentation of the research with a self-reflexive regard for "multiple, shifting identities" (pp. 5–6, 3, 9). Like critical research praxis, autoethnography complicates the role of the researcher and authorizes reflexive methods, in part, as a means of making researchers accountable for their bias and influence, contributing "a greater awareness of the ways

in which the positioning of the [researcher] will influence his or her scholarship" (Reed-Danahay, 1997, p. 16; Sullivan and Porter, 1997, p. 12, 22–27, 68–69).

In other words, my participation in public outreach, my professional, collaborative interactions with park rangers, and my experiences as a participant-observer in a variety of different contexts gave me the advantage of access and insights that would not be available to me had my role been less engaged, more static, or unidimensional. These experiences, my positioning in the field site, and my subjectivity as researcher and collaborator, together, made my engagement in the field site dynamic. My embedded positioning offered me the direct, subjective experience of different perspectives toward the exigencies of public information and outreach, and they influenced my analysis and presentation of participant perspectives and their writing practices, of interactions between participants and park visitors, of the social and ecological issues concerning the park and neighboring communities, and the professional culture among park staff.

By presenting reflective accounts of my multiple, shifting identities and subjective observations of writing practices in the field site in which I took on an active, engaged role as a professional writer, I am attempting both to take full advantage of the breadth of privileged and somewhat kaleidoscopic access that I enjoyed, while also acknowledging that these fluid roles, or positionalities, are partial and contingent. As with the incorporation of researcher reflexivity in qualitative research, in general, my own reflections about what I did, what I observed, and what issues I tangled with in the field site are demonstrative of an active resistance to positivistic claims of objectivity in ethnographic research.

It was not my intention to give this study over to autoethnographic approaches, researcher reflexivity, or my own subjective perspectives. Rather whatever authority, authenticity, and validity qualitative studies accrue, is owed to the degree by which they place researcher reflexivity in the service of multi-vocality—the integration and triangulation of multiple and diverse sources, participant meanings, and perspectives analyzed through the lens of scholarly theories—to the extent that the research constitutes "a 'collage' of voices" (Reed-Danahay, 1997, p. 10; Creswell, 2009, pp. 175–176).

In my research, I have attempted to do this by taking stock of the process of producing texts like the public-facing resource briefs (refer to Appendix I), which I co-wrote with NPS staff to accompany technical reports made available for participants in the public comment period on the wilderness breach draft Environmental Impact Statement (EIS). In tandem with the description of this writing process, I also analyzed and integrated into this study a variety of NPS foundational texts, legal documents, technical reports, protocols, research proposals, publications in ecological sciences, public outreach texts, and documents related to professional interpretive practice—each a text with rhetorical force that circulates within the scope of situated science communication and interpretive practice. I have attempted to integrate "a 'collage' of voices" by reflecting on the motivation for this research and on the experience of encountering disturbance in my writing and research. For example, I have presented thick description of scenes in which my own perceptions, attitudes, and reflection are foregrounded—scenes in which I elaborate on details of studying park interpretation and of writing about ecological science, barrier island

dynamics, and storm mitigation, and on the consequences of engagement with park interpretive rangers and park visitors, with park scientists like Dr. Sands, and with the research site itself. Simultaneously, such thick description extended to my efforts to make vivid the scenes of, for example, civic action, of federal intervention in the aftermath of a natural disaster, of strategic efforts to communicate science to diverse publics, of interpretive trainings, and of park rangers engaged in reflection about their professional roles and their methods of communicating with and educating park visitors.

Autoethnography: Writing a Weave of Logos and Ethos

Cintron (1997) says memory and ethos are woven into the practice of ethnographic research to the extent that "knowledge is, in part, autobiographical" (p. 8). I propose that autoethnographic approaches might allow researchers conducting rhetorical field studies to account for and unravel at least portions of this tight "weave of logos and ethos" in the field, not in an attempt to make these threads discrete once and for all, but rather as a means of showing up the multiplicity of entanglements inherent in ethnographic research (Cintron, 1997, p. 3).

Critiques of self-reflexivity in ethnographic methodology are relevant here. Herndl (1991) maintains that ethnographic methods designed to validate the findings of qualitative field research, particularly procedures like triangulation of data sources, naturalistic thick description, reflections on researcher bias, and other hedges and qualifications, are precariously balanced upon the unstable and dubious, shifting identity of the researcher (p. 322). In the embedded contexts of ethnographic field

research, the ethnographer takes up the privileged—albeit temporary and contingent—status of "insider" among her research participants. Simultaneously, Herndl (1991) argues, the identity that the ethnographer constructs through her written ethnographic research report, articles, monograph, or dissertation is a manifestation of another kind of "operation," that of suppression; the ethnographer seeks to "suppress" her identity *as* participant-observer in order to accrue to her academic-self the authority attached to theoretical, methodological, and critical discursive practices, moves, and gestures (pp. 325–326). These moves represent the researcher's efforts to construct scholarly claims to legitimacy. Herndl (1991) asserts that the conventions of ethnographic methods and practices, including what he describes as a selective toggling between researcher identities, tend to conceal or obscure the institutional demands and constraints incumbent on ethnographic inquiry as well as the effects of these constraints on the representation of the research site and research participants.

However, by boldly resisting the "suppression" of the participant-observer identity, autoethnographic approaches can playfully drive the pretensions of objectivity within the ethnographer identity to their breaking point, creating alternative, multi-dimensional narratives that exceed the binary operation of reveal/suppress. I am interested in the capacity for analytic, theory-driven, situated autoethnographic approaches to enable a substantial accounting of a researcher's multiple, shifting identities in the field. And indeed, autoethnography enables researchers to trace how they embody and negotiate multiple, situated, sometimes competing, broadly collaborative, university- and community-based, and dynamically engaged roles in the field. Sustained critical inquiry among rhetoricians into the

affordances, constraints, and pitfalls of autoethnographic methods as they evolve in the context of rhetorical field studies could also inform ongoing critiques of self-reflexivity, a method integral to the ethnographic practices from which autoethnography takes its cues.

By definition, autoethnography draws heavily upon the self-reflexivity of a researcher who has membership in the social world she studies, and it uses the researcher's personal experience as primary data (Anderson, 2006, p. 379; Chang, 2008, p. 49). However, autoethnography is difficult to pin down, and in pursuit of precedents and models, researchers accept significant risks. Leon Anderson (2010) refers to it as "a hydra-headed methodology" (p. 494). Even as he makes a case for its legitimacy, he has noted that autoethnography risks at times resembling narrative nonfiction more than qualitative research (Anderson, 2006, pp. 376–377; Anderson, 2010, p. 494). Indeed, some autoethnography presses misguidedly at the outer limits of partiality through "self-indulgent introspection" (Chang, 2008, pp. 54–55).

In form, autoethnogaphy often appears distinctive from more traditional types of ethnographic research, but it takes many different forms and purposes. A broad overview of autoethnography's applications would reveal a disorienting array of approaches and texts. Approaches range from "evocative" and "subjective" to relatively systematic, so-called "objective" methods, and autoethnographic texts include narrative-driven works that seem to be memoirs as well as "analytic autoethnographies" that reinforce methodological and theoretical rigor over narrative content (Anderson, 2006, pp. 374, 376–377; Chang, 2008, pp. 44–48). In making a

case for autoethnographic work, Leon Anderson (2006) argues that autoethnography has the potential to be re-established in the "analytic ethnographic tradition," albeit with some refinements (p. 392). In particular, he asserts that in order to move beyond representational narrative, autoethnography must engage in "data-transcending practices that are directed toward theoretical development, refinement, and extension" (Anderson, 2006, p. 387). Regardless of whatever degree of legitimacy autoethnography may accrue to itself in rhetorical studies, it is not all things to all ethnographic research, and its value is context-dependent.

In reflections on their work in a government lab that manages the United States nuclear stockpile, Carl Herndl and Greg Wilson (2007) call for contextually-appropriate methods that enable researchers to take stock of their boundary-crossing work, specifically the sort of work that academics do when called upon to "consult and collaborate with" government agencies (p. 216). They write, "we make an issue of our own alterity, our own boundary-crossing positions as academics and field researchers," a conversation they say "is important to our sense of our cultural location and politics" (Herndl & Wilson, 2007, p. 218). Also, Bruce Horner (2004) asserts that reflexive and multi-vocal methods are often "not materialist enough" (p. 15). In practice, he says, such methods embed a "residual idealism" that problematically chafes against the material and social conditions of the research site (Horner, 2004, pp. 16, 18). In an effort to move beyond this idealism, Horner calls for an approach to ethnographic field studies that "would have us consider and develop a multiplicity of strategies, each appropriate for different circumstances, to be used by researchers and

research participants to define, pursue, and achieve their common projects" (Horner, 2004, p. 31).

I would agree and assert, similarly, that autoethnography is not appropriate for all research contexts, and it is not necessarily appropriate as a methodological frame to be deployed singularly, in isolation from other strategies. Autoethnographic research methodologies have value for rhetorical field studies, but tuning autoethnographic approaches to particular research contexts calls for a coming-to-terms with the situated problems of boundary-crossing, self-reflexivity, material and institutional constraints on research, and more. Autoethnographic methods were relevant and useful for negotiating the dynamic overlaps and interactions between my field research in Fire Island National Seashore and the writing that I did for three years as a research assistant in the Society, Ecology & Communication Laboratory (SEAcomm). In these contexts, and in tandem with other qualitative research strategies, autoethnographic methods supported the tracing of complex subjectivities, of material forces, enmeshments, and power relations, and of dynamic ecologies that shaped my engagements in the field as research and writer.

Dwelling, Agonistic Encounters, and "Multifarious" Inquiry in Rhetorical Field Studies

In "On Being There: Studying Rhetoric in the Field," an introduction to an unpublished volume called *The Places of Persuasion*, Candice Rai and Caroline Gottschalk Druschke (n.d.) point out that it is becoming more and more probable that rhetoricians will encounter "the call" to be there in the field and to conduct studies that

draw upon ethnographic methodologies (pp. 13, 16–17). They suggest a variety of reasons for this, among them, that theoretical perspectives from community-based writing as well as moves toward ecological and new materialist perspectives in rhetorical studies, together, recommend field-based approaches as a valuable means of tracing interactions across already-complex rhetorical dimensions including, for instance, symbolic, social, material, bodily, affective, human, non-human, and ecological dimensions (Rai & Druschke, n.d., pp. 16–17).

Similarly, in articulating the conditions that call for a participatory critical rhetoric for rhetorical field studies, Middleton, Hess, Endres, and Senda-Cook (2015) emphasize the rhetorical and material complexity of field sites "where a variety of (rhetorical) forces are colliding with one another at once to create an embodied and emplaced rhetorical encounter" (p. xviii). Participants in the field site, the researcher, and the site itself are mutually constituted by such collisions of diverse rhetorical forces. When a researcher sets out and enters a field site to examine a carefully defined or particularly interesting network of interdependent rhetorical forces that matter within that field site (and, further, that matter to the advancement of rhetorical scholarship insofar as those forces and rhetorical ecologies demonstrate, perform, or inform a theoretical perspective), the researcher becomes a part of, subject to, and influential in that collision.

Reynolds's (2004) concept of dwelling captures the rhetorical tensions and material consequences of writing research that engages in field based methodology. She theorizes and calls for attention to the materiality of embodied and emplaced encounters that emerge through situated field study, and she offers dwelling as a

concept that marks "a way of being in the world" that is "helpful in re-imagining acts of writing in *material* ways" (p. 140). Reynolds (2004) writes, "This idea of 'inhabiting' discursive spaces connects, of course, with concepts from classical rhetoric—ethos as haunt, for example—and invites us to revisit the connections between habits and places, between memories and places, between our bodies and the material world" (p. 141).

In my own study, I inhabited the discursive spaces of the field site in unique ways—contributing from my home office, for instance, to community-based writing practices that order wilderness, encountering difference as a researcher and writer who traveled half a day to stand at the mouth of the wilderness breach to observe "the circulation of practices that don't show up on a map or in a photograph," and positioning myself alongside scientists and park rangers to translate scientific discourse and ecological dynamics of the shoreline to audiences who were presumed not to have expertise (Reynolds, 2004, p. 143). Dwelling in the places and texts of the field site made it necessary for me to develop "habit and familiarity" with the discursive practices of science communicators, park managers, public information officers, and park interpretive rangers, and to move through their texts to the extent that I could demonstrate "confidence and knowledge" as a public outreach writer myself (Reynolds, 2004, p. 163). My goals for analyzing science communication and education in the park site, the practices of dwelling within these discursive practices, of participating, observing, collecting data, analyzing, and writing cannot be regarded as anything but intertwined.

It matters to take stock of the affective tensions, palpable frictions, and embodied feelings that emerge from the practice of dwelling within the tight weave of logos and ethos that defines ethnographic research and discourse, where objectivity is "pretense" (Reynolds, 2004, p. 137). Reynolds (2004) recommends attuning to "structures of feeling or felt senses that are deeply emotional, visceral, embodied," which can enable researchers to locate exclusion, difference, or places where "they could straddle a threshold" (164). Building from similar assumptions, Druschke (n.d.) argues that "rhetorical fieldwork is itself an agonistic encounter: bursting with the sorts of discomforts and tensions that make researchers sensitive to those that emerge in the lives and words of their research subjects" (p. 1). The *agônistic* methodology she discusses asserts the value of the "agonistic encounter of rhetorical fieldwork" to produce "significant insights for intervention" (Druschke, "Agonistic," n.d., p. 2).

Field work is complicated by engagement—by the implicit but also sometimes palpable tensions (Druschke, "Agonistic," n.d., p. 1) between researchers and research participants as they navigate power relations, material conditions, political and social forces, institutional politics, differing interests and agendas, and the forces of binaries and metaphors to construct environments and identities in scenes of teaching, writing, and learning (Dautermann, 1996; Sullivan & Porter, 1997, pp. 163–187). Emergent insights within the context of the field site complicate methodological assumptions and plans (Sullivan & Porter, 1997, pp. 177–179).

In encountering such tensions, Sullivan and Porter (1997) urge a methodological approach that makes something of the encounters or "tensions [that] drive research" and that is contingent and flexible, "heuristically forged out of a

study's needs . . . out of participants' needs" (pp. 182, 187). Also, in advancing praxis, "a perspective that sees research as a kind of reflection-in-action," as a dominant organizing concept for critical research practices, Sullivan and Porter (1997) argue for empirical research that is grounded, reflective, and theoretically informed (p. 186). They assert, "Rather than granting abstract Theory or Knowledge the privileged position, this research perspective sees knowledge as local, as contingent, and as grounded not in universal structures but in local, situated practices" (p. 10). This perspective "privileges neither the theoretical foundation nor the observed practice. It is a research perspective willing to critique both theory and practice by placing both in dialectical tension, which can then allow either to change" (p. 27). Central to this methodology, which Sullivan and Porter (1997) refer to as postcritical, is a critical, reflective approach to research that "develops and arises through the process, in dialogic concert with research participants" and that recognizes material conditions, power relationships, and "multiple and shifting subjectivities," among and between researcher(s), research participants, research sites, and sponsoring institutions (pp. 42, 186).

Scholarship that marks and asserts the urgency for grounded rhetorical field methodologies and which demonstrates the possibilities for empirical research to take stock of dynamic symbolic action are emerging in concert with a surge of scholarly interest in post-critical inquiry and an impulse toward intervention. Rather than mobilizing rhetorical theory toward critiques of social structures of power, and rather than "dissolving dichotomies and classes" (Collins & Evans, 2002, p. 239) in order to elevate marginalized perspectives, strains of post-critical rhetoric and scholarship in

the rhetoric of science instead have scratched at the tenuous foundation of critical methodologies associated with postmodernist commitments. Most recently, the Association for the Rhetoric of Science and Technology (ARST) organized its 2016 convention in Philadelphia, around the theme of "Post-Critique Rhetorics" and grounded its call for papers in the following concern:

> Ultimately, arguments for post-critique or upstream rhetorics suggest that the appropriation of postmodern epistemology for dangerous political agendas (climate change denial, anti-vaccine movements, AIDS denialism, etc.) warrant a reevaluation of our more critical modes of inquiry and serious consideration of new non-activist interventional methodologies. (ARST, 2016, para. 1)

While critical methodologies favored situated, multi-vocal scholarship made valid by virtue of qualifications and hedges associated with reflexivity in the form of acknowledgement of researcher bias, positionality, and subjectivity, these methodologies simultaneously maintained the assumption, to some degree, of critical distance, as critiques of critical ethnography have demonstrated (Herndl, 1991, pp. 322, 325–326). Post-critical theory appears to embrace, still more, the entanglement of the researcher or critic on the ground and proposes a new dimension for social constructionist epistemology that validates the intentional intervention and participation of experts in the field sites they study. As the organizers of ARST proposed, following Collins and Evans (2002), post-critical methodologies may work on the ground to mobilize rhetorical theory for "upstream work" (p. 240).

In Latour's (2004) re-evaluation of critique and its affordances in a globalized, post-truth culture that, paradoxically, uses the "weapons" of postmodern critique to advance an "artificially maintained scientific controversy" (p. 226), he calls for a tempering of postmodernist attitudes toward positivistic research and empiricism. Of the impulse toward critique he wrote, "The question was never to get *away* from the facts but *closer* to them, not fighting empiricism but, on the contrary, renewing empiricism" (p. 231). Looking toward the future of post-critical scholarship, Latour (2004) unveiled how critique produced blind spots, for instance, theory and practice that foregrounded how social relations and material conditions constituted "matters of fact" to the exclusion of a direct engagement with "matters of fact." He urged scholars to pursue instead "the cultivation of a *stubbornly realist attitude*" (p. 231) and engagement in "multifarious inquiry . . . to detect *how many participants* are gathered in a *thing* to make it exist and to maintain its existence" (p. 246). Post-critical scholarship, he argued, should be motivated by an impetus "no longer to debunk but to protect and to care," a critical move that is intended to build critique which "*adds* reality to matters of fact" (Latour, 2004, p. 232), which retains "the obviously webby, 'thingy' qualities of matters of concern" (Latour, 2004, p. 237) without "subtracting" any of its "sturdy" parts, its "participants, its ingredients, nonhumans as well as humans," the fact-y facts and object-y objects of science and technology (Latour, 2004, p. 246).

In my field research, which examines science education practices through the lens of technocratic and participatory theories of science communication, and in my science writing for a government-funded storm mitigation project, I was well situated

to get "*closer*" to matters of fact (Latour, 2004, pp. 231, 244) without eliminating constructionist critique and, very possibly, without minimizing the findings of climate science. That said, I was also positioned, through my everyday participation in field-based research and in collaborative writing, to feel the weight of the paradox that Latour describes.

I experienced, in very tangible ways, the tensions between methodologies that compelled me to debunk and topple the one-way relations of power of technocratic communication practices, and practical, discursive efforts to affirm the value of scientific research, translate its jargon, and inform non-specialists about the knowledge that the natural sciences deliver. I felt and grappled, personally and intellectually, on a regular basis with the seeming incompatibility of critical and scientific ways of knowing as these relate to science communication. I sensed that tension as I sought "to protect and to care," and I did not know how to resolve that tension for myself or for the benefit of the diverse participants engaged in issues related to my research and writing: the NPS rangers who consented to being observed and interviewed, the people who comprise the audience for park interpretation and park information, my writing collaborators, including my colleagues at the University of Rhode Island, members of park staff, scientists, and students from a variety of institutions, plus the untold numbers of people who have a stake in the changing ecosystems and physical contours of the south shore of Long Island and of Fire Island.

Rather than resolve the tension or propose a tidy reconciliation, I have attempted, with this study, to present the thick and material, vital and multivocal, human and nonhuman, discursive and embodied figures that assemble (as issues and

as assemblies) in writing science, and to draw out from these issues and assemblies what playful improvisation and dialogue can mean in teaching science writing. In attempting to practice “multifarious inquiry,” as Latour (2004) points out, "The surprising result is that we don't master what we, ourselves, have fabricated, the object of this definition of critique" (pp. 246, 247).

Locating Emergence and Tension in “Play”

Notes on Method

Through my role as a researcher and through my position as writer of NPS public outreach materials, I conducted on-site observations spanning a total of approximately 70 hours at FIIS staff trainings and workshops, on-site interpretive programs, ranger-guided tours, conferences, and meetings. I also conducted 13 interviews with researchers and science communicators affiliated with NPS and 10 semi-structured interviews, formal and informal, with members of the park’s permanent and seasonal interpretive staff, who are responsible for educating fellow park staff members, volunteers, the media, community organizations, and park visitors about specialized information related to park science, the management of the park’s natural resources, and social, economic, historical, and cultural values and issues that have shaped park resources.

Among my research participants were the park’s science communication park ranger, the chief of interpretation and education, and permanent and seasonal interpretive rangers. With some participants, I conducted IRB-approved interviews using protocols comprised of closed- and open-ended questions that were designed to

elicit details about each participant's role in FIIS education and outreach; information about participants' backgrounds, values, and ideas about teaching with play; and reflections on their writing, program development, communication, and teaching practices.

During observations and interviews, I also seized on opportunities to prompt participants' reflection on events that I had observed in the field. Taking cues from research in writing studies that seeks "to understand (and value) what teachers know" and that favors the reflection of research participants as a means to "bridge theory and practice" and to "open up a 'window' to concerns beyond the immediate topic of discussion" (Flower, 1994, p. 8, 19), I used field-based observations to inform the protocols for semi-structured interviews. Reynolds (2004) similarly exemplifies this research practice in the form of prompts for reflection and mental mapping activities that emerged from events in situ and that stimulated research participants to reflect critically on their relationships with the spaces of their on- and off-campus "lifeworlds" (pp. 86, 186). Likewise, Herndl et al. (2011) identify emerging themes in situ, thus engaging the analytic dimensions of research while data collection is ongoing and also opening opportunities for the researcher to adjust interview protocols in response to preliminary information or findings (pp. 441–444).

The flexibility offered through emergent methods, such as those I have just described, make it possible for ethnographers to enact valid and systematic ethnographic research while simultaneously developing ethical, participatory, postcritical methods as the research unfolds and "in dialogic concert with research participants" (Sullivan & Porter, 1997, pp. 42). Emergent methods aid in the

reconciliation of some of the most deeply rooted binaries in qualitative research—like theory/practice, researcher/participant, academic/community—by integrating into the preliminary design and composition of field-based research and scholarship the knowledge, meanings, language, and values articulated by research participants in the context of systematic inquiry. Participant meanings emerging during data collection, especially unexpected outlying meanings, thus stimulate the identification of language to be used in interview protocols and as themes for analysis (Creswell, 2009, p. 184).

In the case of my own research, emergent methods enabled interviews with participants to be an occasion for prompting relevant, critical reflection, an invitation for research participants to reflect on their choices and motivations related to their interpretative work, not in a generalized way that foregrounded my own aims, biases, expectations, or privileges, but in a responsive way that foregrounded and was informed by the particular events that occurred in the field, the current circumstances of interpretive practice, and the specific activities that FIIS park rangers designed and delivered. Thus, qualitative procedures were emergent in situ to the extent that I adapted inquiry, especially follow-up interview protocols, to align with the local, situated interpretive contexts that shaped this research.

Also, the work of park rangers is peripatetic. While I conducted formal observations and some interviews, too, on foot during walking tours, I also encountered unexpected opportunities to speak with participants informally during breaks between trainings, or as we rode the ferry across Great South Bay from the south shore of Long Island to Fire Island visitor centers. The conditions of this field research also demanded a degree of adaptability. Changing weather on Fire Island

meant changes in the schedules of walking tours. The safety and logistical requirements of a canoe tour meant that, while taking notes and recordings periodically on the water, I also assisted a father and his young son who needed a second adult to row in their boat. When one interview was cancelled due to illness, I was invited by a senior ranger to spend a day instead with two newly trained rangers who had not previously agreed to be participants in my study, a situation, which, I believed, from an ethical perspective, warranted a different approach to data collection that day. Above all, my participant-observer status, my tenuously "insider" but equally questionable "outsider" status, combined with my extended presence in the field site, and the rapport that I developed with park staff, and the welcome and support that senior park staff extended to me, enabled me to seize kairotic opportunities in the research site to engage in informal interviews with participants, which sometimes were more revelatory than the semi-structured interviews for which I had prepared meticulously.

Notes on Ethics

There is a paradox at play here. The affordances of emergent methods, dynamic participant-observer roles, and mutivocality notwithstanding, an outstanding methodological tension strains at the possibility of doing this research ethically and critically. The origin of this tension can be found in the operation of the very word that frames this inquiry: "play." I set out to understand the different affordances of play in community-based teaching contexts and the various, complex, and nuanced ideas and values that shape FIIS interpretive rangers' approaches to play. My research plans,

thus, articulated some very specific aims. I proposed analyzing the uses to which play is put in this context and the reasons participants articulate for teaching with play.

However, this concept, so central to my study became recognizable as an imposition before my field study even began. It is decidedly not an in vivo term, but rather one that belongs to writing studies and animates play theory and ludology across several humanistic and social science fields, including psychology, education, and sociology. Before I gained permission to conduct my research at FIIS, the public information officer for the park, Veronica, and the director of interpretation, Sally, both of whom later became research participants, cautioned that I would not likely observe play taking place in the park's interpretive programs. Thus, from the beginning, the very concept that mobilized my research was contingent, tentatively defined, slippery, sometimes dubious, and for the duration of my active research, negotiated.

Moreover, the stigmatizing baggage that accompanies "play" across academic contexts and makes it a precarious concept for serious scholarly production and pedagogy is similarly liable to elicit doubt on the part of professionals confronted with complex science communication issues (Rouzie, 2000). For this reason, the preliminary doubts, and later, the ostensible openness that research participants expressed toward this defining concept in my research, I believe, may have contributed as much to my interpretations of engaged, playful interaction in the field site as my own biases and professional motivations.

The tension between research plans and aims, the institutional and professional conditions that shape them, and the challenges that community-based practices,

knowledge, or meanings may pose to them is a matter of ethical concern for ethnographers. As Carl Herndl (1991) has pointed out, when rhetorical studies, as a discipline, orients inquiry, research agendas, methodologies, and pedagogies to public settings and contexts, the problems, deliberations, and discourse of those communities outside of the university become subject to, and their problems are refracted through, the practices, material conditions, rhetorics, culture, and ideology that belong to the academic institution and the ethnographer (pp. 320, 323). Aaron Hess (2011) affirms that rhetorical studies belong in public settings, among public communities outside of university or classroom contexts, not only insofar as these rhetorical contexts are accessible through textual artifacts, but also in situ, where embodied, performative, and material meanings become available to the rhetorician-researcher. He argues that critical-rhetorical ethnography "is aimed at a more public audience. Rather than seeing deliberation as it *occurred*, rhetorical ethnographers see deliberation as it *occurs,* and most importantly, ethnographers participate in its action" in order to examine a "text" that is "living, breathing, and operating within unique spaces and received by particular audiences." (pp. 129, 130).

The imposition and the potentially distorting force of the researcher's academic subjectivity, institutional biases, and research aims in a community-based field site calls for making visible the material and institutional conditions shaping ethnographic knowledge- and meaning-making (Herndl, 1991). The challenge for critical ethnography as Herndl (1991) puts it is, "to discover the sources of ethnography's persuasive power. This task might help us develop ways to acknowledge and integrate the ethnographer's constitutive activity within the

ethnographic text. We need to make the critical gesture at the same time that we describe findings" (p. 323).

Before I even began interviewing research participants formally, I started to hear them reflecting, in informal off-the-record conversations, on the possible relevance of "play" for what they do, that is, for park interpretation and for educating diverse public audiences about park science. This inquiry, through which I actively negotiating meanings with research participants, commenced before the study properly began, when I was still revising my NPS research permit application to address the concerns of park staff. When requesting a research permit from park managers, I applied tentative definitions to explain the broad possibilities for "play" across different contexts, for instance:

> Writing studies scholars discuss 'play' in various ways, and their definitions are not always conventional. However, for the purposes of this research, play can mean anything from games for learning to activities that are exploratory and relatively open-ended or that welcome unpredictable responses.

Subsequently, the semi-structured interviews that I conducted opened opportunities for research participants to actively question these operative meanings of "play" and to challenge their relevance for park interpretation and science communication.

In one interview with Veronica, for example, when I asked her about role-playing activities and impromptu creative, collaborative multimodal writing activity that she asked park rangers to do in a training, she hesitated to say that these were playful to the extent of being open-ended, exploratory, or welcoming of unpredictable

responses. She also pointed out that the majority of the work she does is creating public outreach texts that are typographic or print-based, including "talking points, informational handouts, online web pages, social media," and these, she said, offer limited or even no opportunities for interaction. They don't give audiences the chance "to throw me for a loop," she said. In this way, Veronica suggests an understanding of play as necessarily including interaction. Also, beyond the welcoming of unpredictable responses that I had suggested, she seems to associate play with a disruption of control or a rebalancing of agency. Rather than the ranger-educator as agent welcoming unpredictable responses, an audience member seizes an opportunity to "throw" the ranger off her game.

In moments such as these, research participants elaborated and refined their understandings of a concept that defined my research. Though the term in question was far from an in situ term, it became one through the course of my field work as participants considered, challenged, wrestled with, and reworked an understanding of play that I had proposed. As a result, they formulated multiple new possible understandings of play that made sense in the context of their knowledge, experience, and values. They took up the term that I imposed and considered it in the context of the practices, material conditions, rhetorics, culture, and ideology that belong to the National Park Service and the professional interpreter.

It is no tidy affair to make a distinction between the methodological pitfall of imposing meaning, which I did, and the more favorable qualitative research practice of drawing upon emergent, in situ meanings, which I also did. As a researcher, it would

be convenient for me to observe the refining and re-defining that research participants engaged in as something that transcended "the constitutive activity" of the researcher (Herndl, 1991, p. 323), and that instead empowered research participants as an emergent reciprocal benefit. Indeed, before I began my field study, when I designed my research and prepared an application to my university's Institutional Review Board (IRB), it was my intention to offer research participants just such an indirect benefit: "an opportunity to reflect on their interpretive practices at a time when FIIS interpretive staff are being encouraged to discover new ways of making interpretive activities more interactive." I also made this potential, aimed-at indirect benefit explicit in the consent forms that each research participant signed.

It is precisely this sort of methodological coyness that post-critical methodology attempts to challenge and resist: the "liberatory theme . . . critically unaware of its own implicit collusion with the patriarchal tradition" (Sullivan & Porter, 1997, p. 42). Even as research participants articulated their own understandings of terms that I introduced as part of my study, they also validated and on some occasions, I felt, elevated my knowledge and expertise by inviting me to participate in staff trainings and contribute to the park's public outreach, and by aligning my inquiry with their internal initiative to make interpretive activities in the park more discovery-based and interactive.

For instance, in our interview immediately following an interpretive staff training, as Veronica actively reflected on play in her interpretive work, she said, "As Sally [chief of interpretation at FIIS] mentioned today, *and as you've kind of indicated*, self-discovery and discovery *through play*, and hands-on experiences are

what we need to be facilitating" (emphasis added). Veronica explicitly aligned her own and Sally's understandings of play with mine and adopted this concept in relation to the trajectory of the park's long-range interpretive plan, even though, not long before this interview took place, she was skeptical about play in reference to what interpretive staff do in the park. My study shaped our discussion and, to some extent it seems to have influenced the way that park interpretive staff understood their preliminary, formative work to develop a new interpretive plan.

It is impossible to draw a definitive line between the potentially hazardous impositions of community-based ethnographic research, on one hand, and the rhetorically situated possibilities for engagement, intervention, and ethical social action made possible through community-based ethnographic field research, on the other hand. I would not suggest that the acknowledgement of local, material, affective, and ecological difference and tension, or the disclosure of positionality, or the narration of embedded, emplaced subjective experience through autoethnography are enough to reconcile the problems of ethnographic research. However, my field research, along with the methodologies, theories, practices, interactions, conversations, and discursive spaces that shaped it, demonstrates how multivocal ethnographies that disclose competing narratives (Sullivan & Porter, 1997, pp. 181–182); that resist the pretense of critical distance and get "*closer*" to matters of fact and mine emerging tensions; that reveal the shifting positionings of the embedded researcher as well as the insights generated through a researcher's engagement with symbolic, social, material, bodily, affective, human, non-human, and ecological dimensions of the field site, can approach ethical situated and reflective praxis.

CHAPTER 5

A Conclusion:

Teaching Writing with Play

Veronica remembers some of her first days as a seasonal interpretive ranger at FIIS. She was often assigned to the Wilderness Visitor Center, which is located near the easternmost point of the park site and is so named because it provides an entry point for park visitors to explore the Otis Pike Fire Island High Dune Wilderness. From the Visitor Center, the wilderness runs west for seven miles. Visitors find dunes, beach grasses, protected wildlife, salt marshes, and a historic shipwreck here.

For park visitors stopping by this particular place, Veronica became the most available authority to speak about the biological, physical, cultural, historic, ecological, oceanographic, geographical, and geological phenomena that make Fire Island distinctive. She was not trained as a scientist, but she has long worked for conservation organizations "serving to break down information for a broader audience." Veronica made a point of telling me,

> I always say I'm not the science communicator. It's our coastal ecologist or our park biologist or our park wildlife biologist or the researchers themselves who are the science communicators. They're communicating their science to me or to [other park interpretive staff], and we, then, are synthesizing it further. So we're really just serving as a bridge . . . getting the science from the source itself.

In her first days as an interpretive ranger at FIIS, Veronica recalls the excitement that stirred her as she, informally, studied the ecology of Fire Island. That excitement mattered, she told me, "When I was a seasonal interpreter, I sat there with a new field guide every day and was super-excited about what I was learning, and I drew pictures, and I talked to people who came in the Visitor Center about whatever the thing was that I was learning."

Her approach to park interpretation, at least in moments like these, was not a formal pre-written program or scripted interaction, but rather an emergent and sometimes collaborative process of discovery. Veronica initiated exploratory interactions, inviting park visitors to join in her in-progress quest. Whether she was looking at plants, animals, shells, rocks, or sediments, when Veronica spotted an unfamiliar specimen or captured its form in the lines of a drawing, that wilderness feature spurred Veronica along in her endeavor to know more about the ecologies of Fire Island. As she compared her field observations and drawings to the images and text in the pages of the field guide, visitors approached and became potential collaborators. Engrossed in the quest to know more, Veronica engaged others. She invited them to test some ideas, to play. And while she relied on authoritative sources of information in those moments (field guides, for instance), there was no static source of knowledge that dictated *how* Veronica would tentatively interpret the significance of each specimen for park visitors. This latitude for frequent, flexible, and spontaneous encounters with the wilderness and its human visitors informed and shaped Veronica's interactions to the extent that her interpretive approach was, from the first, emergent, kairotic, rhetorical, and embodied.

Later, Veronica became a science communications park ranger who provides a science communication training for new seasonal park staff, and she speaks of her time in the park's Wilderness Visitor Center in the past-tense. She describes her current position as including many of the responsibilities of a public information officer for the park, and she refers to this role in stark contrast to her early days as an interpretive ranger. Even though her current position places her, professionally, among the ranks of interpretive staff, she is, physically and socially, no longer squarely positioned there. Now, she occupies a small office on grounds that serve as park headquarters. It's a modest space tucked into a low-slung building off of Fire Island and across Great South Bay on the south shore of Long Island. Veronica's time on Fire Island proper and in the park's visitor centers, and her day-to-day interactions with the natural ecosystems of the park—the kind that once stimulated her learning and her engagement with park visitors—are significantly limited by this newer role in the park.

"Now that I'm sort of entrenched in this other stuff, I don't get to crack a field guide and open and say, 'Wow! That's so super-cool!' and remember that that's powerful and interesting," she says.

The other "stuff" she refers to includes the creation of print and digital texts, presentations, and social media posts designed to educate public audiences about science in the park and to ensure consistent public messaging about emergent issues in the park. Veronica writes resource briefs, press releases, and fact sheets, delivers public presentations for local and regional stakeholder groups, and she generates

internal documents such as basic talking points that seasonal interpretive staff can use to guide their conversations with park visitors.

Although her writing reaches across park activities, programs, and personnel as well as across local communities, and while the products she creates are endorsed by the park superintendent and imbued with the authority of the park's natural resource managers, there are limits to what Veronica's print and digital texts can do. They cannot, for instance, replicate the dynamic, collaborative exploration that she was able to initiate through her in-park interactions with park visitors.

The goal of interpreting park science, of engaging park visitors in dialogue about management decisions, and of engaging participants, bodily, in the places of the park, is not just to inform, to deliver content. It is to create stewards of National Parks and their natural, structural, and cultural resources. The question remains whether engaged interpretation, like facilitated dialogue, as a means of rhetorical delivery can accomplish this sort of making, identity-building, identification. In the meantime, Veronica's experience shows how rigidly controlled texts or discursive spaces create barriers against park visitors shaping their learning, engaging their distinct knowledge and perspectives, and having meaningful, rewarding experiences; they also prevent science communicators from engaging in an exchange that brings to light important perspectives and knowledge and that contributes to productive collaboration. On the other hand, opening up the possibility for playful, collaborative inquiry, reciprocal exchange, and unpredictable responses could enable all of these things. And while doing so poses risk and demands a tolerance for uncertainty and a willingness to

improvise, it also fosters positive relationships and transformative participatory practice.

This study has focused much attention on the situated, local implications of rhetoric for park interpretation at Fire Island National Seashore, but I also see the observations and analyses of this study as having direct implications for the writing classroom, especially for the science writing classroom. Veronica's experience of toggling between two distinct roles as a science communicator in the park helps to vividly exemplify some of the important distinctions between playful, collaborative writing and learning, and a writing environment that is focused on production. So, I return to the original impetus for this research—my questions about what can be learned from science educators in a community-based setting and about what play can mean and do in writing classrooms.

First, I offer a challenge to pedagogical practices that take as obvious the need to evade—rather than make something of—disturbance in the writing process. As I developed this research and spoke with colleagues, at conferences and elsewhere, about the possibilities for pedagogies of play in the writing classroom, objections were most heightened in relation to the teaching of science and technical writing. I heard concerns about teaching fixed and stable genres that circulate within professional contexts and which require attention to the dictates of precise form. I heard that these genre conventions are not to be meddled with. Play has no place there. Students must take seriously the need to master the genre conventions, right down to the perfect application of every minute formatting requirement and punctuation mark. Play would interfere with students gaining mastery of genres that demand obedience.

However, when I call for play, I am not calling for the complete dismissal of genre-learning, or for inattention to detail in writing. Instead, I propose that play can enable a holistic, rhetorically aware approach toward learning about and practicing writing public science communication. Pedagogies of play offer a framework for contending with disturbances in the writing process, especially disturbances that emerge from the risky, sometimes unruly aspects of community-engaged writing and experiential learning.

In my own experiences as a writer, I learned to evade and make do long before I learned to *make something of* disturbances. As a teacher of writing, I expect that student writers will, likewise, meet with ideas that exceed their expectations and understanding, test their boundaries, and perhaps even seem to chafe against the academic contexts in which they are writing (Reynolds, 2004; Wysocki, 2004). This expectation motivated my interest in pedagogies of play, because I think that if I am serving my students well, then I can nudge them to make something of disturbance events like the one that I encountered in my interview with Dr. Sands.

In my own writing classrooms, play has meant loosening up tightly-controlled activities and assignment sequences in favor of making space for the creative, intelligent people in my classes to shape their own learning experiences. I orchestrated time for students to test their ideas, improvise, and tinker with unexpected possibilities, identify kairotic moments and respond on the fly, solicit abundant feedback, explore alternative approaches, and change their minds. From theories of collaborative learning (Elbow, 1973; Holt, 1993), multimodal and new media writing (Fulwiler & Middleton, 2012; Shipka, 2006; Shipka, 2011, pp. 83–109; Wysocki,

2004, pp. 13–22), writing center theory (Boquet, 2002, pp. 68–76), the history of rhetoric (Jarratt, 1991), community-based writing (Mathieu, 2005), and scholarship that deals explicitly with pedagogies of play (Rouzie, 2000; Colby & Colby, 2008), I gleaned that play, as a pedagogical approach, could offer more autonomy, flexibility, and choice for students by placing a high premium on improvisation, exploration, and discovery. In these senses, play became a means for me to redirect my students' attention away from the structures and limits that I had imposed and toward rhetorically situated "layers of invention" (Colby & Colby, 2008, p. 310) as part of collaborative learning experiences that, I think, allowed students to respond to disturbance events or even create their own.

Beyond these teaching practices, this research has prompted me to reconsider how play might inform or challenge rhetorical instruction in science writing. I propose that teachers of writing might facilitate experimentation with the critical-creative production—or rigging—of professional genres and public science communication texts to promote the inclusion of diverse and marginalized perspectives, knowledges, and ways of knowing. In writing, this can be done in much the same way that a person bodily comes to understand her center of gravity by teetering off balance, which can happen whether a person deliberately, playfully puts her body in a position of instability or finds herself there unexpectedly, through some disturbance. I do not propose that by experimenting playfully with texts students will necessarily transform or resist professional practice (although I can see that as being a generative outcome of play, as well). Rather, playful instruction in science writing could carve out opportunities for students to test conventional discursive practices or genres, press

them to their breaking points in order to observe and reflect on what those conventions are made of—what epistemological assumptions, what power relations, what circulation practices—and to consider how dynamic rhetorical ecologies make those texts possible, relevant, consequential, and effective, or not.

The point is to bring students' awareness to the ways in which discursive practices shape, confine, or even exclude their—or their audience's—opportunities for response. Play can be a useful strategy in empowering students by providing them with critical, creative opportunities to formulate challenges to values, assumptions, and ways of knowing that would otherwise operate invisibly. As Wysocki (2004) says, "agency comes precisely in being alert to the 'social forms' . . . in which we move, in understanding where and how we and our practices fit, and hence where and how we have room and opportunity to make change" (13).

To offer an example, in a writing workshop I facilitated for a graduate course in marine affairs (MAF 564: Port Policy and Planning), I asked the students and their professor to reconsider the constraints of a genre that is relevant to their academic and professional field: the policy memo. I guided the class through a genre analysis, through which students observed that a well-behaved policy memo features a crisp, objective, authoritative voice that avoids qualification.

I then introduced a contextual, or rhetorical, model of technical and science communication, characterized by deliberative and inclusive rhetoric. Using the theoretical lens I introduced, students considered how this model could inform their approaches to writing policy memos. They playfully imagined breaking their model, intervening in the conventions of the genre to expose its limits. In doing so, they

critically examined the values, ways of knowing, and professional and cultural assumptions that operate invisibly through the language conventions embedded in policy memos. Their analyses illuminated some of the consequences of a genre that produces a one-way flow of information, conceals uncertainty and complexity, and discourages inquiry or deliberation.

Rather than simply teaching students how to play by the rules of any given genre, play can offer opportunities for students to test the limits of discursive conventions and become rhetorically aware. When students are rhetorically aware, they are better prepared to open possibilities for innovative, inclusive, and socially just ways of writing in academic, professional, and public contexts. They are better prepared to make change, to *make something of* the discursive practices, social structures, and material conditions that shape their choices for symbolic action in any given situation.

APPENDICES

Appendix I

Examples of Resource Briefs Created by SEAcomm

Fire Island National Seashore

National Park Service
U.S. Department of the Interior

Fire Island National Seashore
Long Island, New York

The Fire Island Wilderness Breach:
Shifting Shorelines and Shoals

Within 48 hours of Hurricane Sandy, coastal experts and researchers from the State University of New York at Stony Brook, the U.S. Geological Survey, and the National Park Service began monitoring the wilderness breach. They continue regular monitoring of breach shoreline position, depth, and tidal exchange, as well as water levels and water quality in Great South Bay.

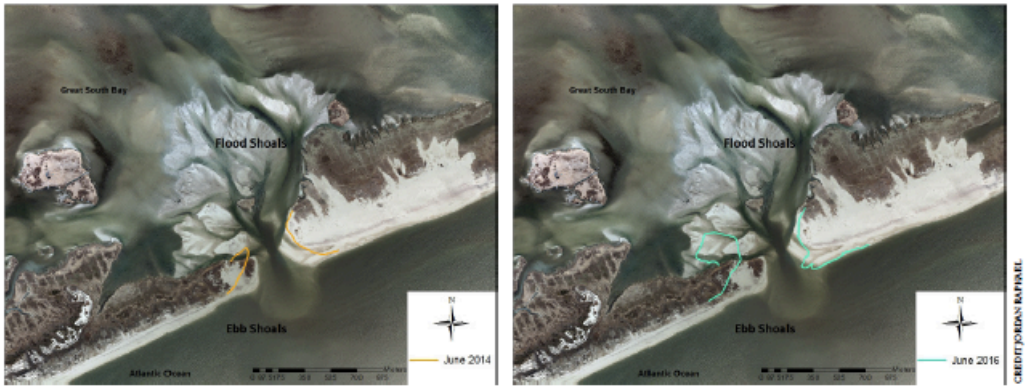
Breaches are channels connecting ocean to bay which form during powerful storms. These natural barrier island features can come and go over time. On October 29, 2012, Hurricane Sandy created a breach within the Otis Pike Fire Island High Dune Wilderness, a federally-designated wilderness area on the eastern end of Fire Island National Seashore. The wilderness breach occurred in a narrow, low-lying area that is historically prone to breaches. This part of the barrier island is called "Old Inlet," because in the 1800s, a breach occurred here that remained open for approximately 60 years before closing through natural sediment transport processes. The National Park Service will complete a Breach Management Plan/Environmental Impact Statement (EIS) to determine how best to manage the breach within Fire Island's wilderness area. The science summarized here and public input will support the planning process.

Shifting Sands of the Breach

Longshore transport, also called littoral drift, is one of many natural processes controlling the movement of sediment to, from, and across Fire Island and impacting the barrier island's shape and position over time. Waves typically approach from the southeast and cause sediment to move westward along Fire Island's ocean shoreline. Natural processes like littoral drift and aeolian, or wind-driven, transport cause sand to shift from place to place and from formation to formation.

Natural processes controlling the shape of the barrier island also influence the shape and position of the wilderness breach. As a result of natural sediment transport processes and storms, the wilderness breach migrated west, which is typical of breaches on Long Island. Shoreline position data, measurements of water depth, and aerial photography collected as part of monitoring efforts show that the breach is dynamic, but it has been relatively stable since 2013.

When it opened, the breach displaced sand from the barrier island into Great South Bay. Waves reworked the sand into flood and ebb shoals, accumulations of sand that occur on the bay side (flood) and ocean side (ebb) of the breach. Over time, these shoals will serve to widen the island, provide platforms for the growth of new salt marsh or other habitats, and enhance the resilience of the barrier island to future storms and sea level rise. The breach has caused localized erosion immediately to the west. However, the ebb shoal that formed on the ocean side has remained relatively small and stable, indicating that the breach is not interrupting the sediment transport system. Sediment continues to move west along the ocean shoreline with littoral drift.



Data from breach monitoring studies reveal how the breach shoreline position has changed over time. The aerial image, above, was taken in 2013, and the color-coded shorelines were recorded in 2014 (left) and 2016 (right). Despite fluctuations in the shape and position of the breach, it is relatively stable. The width of the breach remains fairly narrow, ranging from 250 to 750 meters, and maximum depths range from 3 to 7.5 meters.

The Future of the Breach

The breach will continue to change. Future storms will cause further changes to the shape and position of the existing wilderness breach. While scientists cannot be sure how the breach will change, sediment cores taken to the east and west of the breach reveal a layer of clay deposits which should limit its migration.

The National Park Service will release the Draft Fire Island Wilderness Breach Management Plan/ Environmental Impact Statement (Draft Breach Plan/EIS) to evaluate alternatives for managing the wilderness breach. The desired outcome of the plan is to ensure the continued integrity of the natural and cultural features at Fire Island National Seashore and in Great South Bay, while protecting human life and managing the risk of economic and physical damage to surrounding ecosystems. The Draft Breach Plan/EIS was prepared using the best available science and in accordance with the National Environmental Policy Act, the National Historic Preservation Act, and in compliance with all applicable laws, regulations, and policies.

We Want to Hear from You

The Draft Breach Plan/EIS will be released for a 45-day public review and comment period. Please submit your comments online or by mail:

Online: parkplanning.nps.gov/FireIslandBreachManagementPlan

By mail: Attn: Superintendent
Fire Island National Seashore
120 Laurel Street
Patchogue, NY 11772

Fire Island National Seashore
National Park Service
U.S. Department of the Interior
nps.gov/fiis

university of rhode island
SEAcomm
society, ecology & communication laboratory

Jamie Kemillard, Paul McDivitt, and Caroline Gottschalk Druschke
Acquisition, Coordination, Compilation, Data Management and Change Analysis of LIDAR and Other Geospatial Data Collected Pre- and Post-Hurricane Sandy
Task Agreement P13AC00875 of Cooperative Agreement Number P09AC00212

Fire Island National Seashore

National Park Service
U.S. Department of the Interior

Fire Island National Seashore
Long Island, New York

The Fire Island Wilderness Breach:
Ecological Resilience in Great South Bay

Change, including dramatic change caused by powerful storms, is constant across the complex and vital ecosystem of Great South Bay. Because everything within an ecosystem is interconnected, even small changes in the environment can produce ripple effects throughout the entire system.

Breaches are not uncommon. They come and go on barrier islands over time, allowing the free flow of water between the ocean and bay. In October 2012, Hurricane Sandy created a breach in the Otis Pike Fire Island High Dune Wilderness. This change altered water circulation patterns in eastern and central parts of the bay and caused higher salinity in eastern parts of the bay. It also increased the exchange of organisms between ocean and bay waters. As a result, the ecosystem of Great South Bay has matured. There is an increase in species diversity, leading to a better, more complex food web. The breach also improved water quality in Bellport Bay and eastern Great South Bay in the immediate vicinity of the wilderness breach by increasing water clarity, diluting the bay's harmful nitrogen levels with ocean water, and prompting a decrease in brown tides. The National Park Service will complete a Breach Management Plan/Environmental Impact Statement (EIS) to determine how best to manage the breach within Fire Island's wilderness area. The science summarized here and public input will support the planning process.

Brown Tides

Brown tides are caused by especially frequent and intense blooms of the single-celled phytoplankton species *Aureococcus anophagefferens*. The phytoplankton blooms are so dense that the water turns dark brown. In general, brown tides destabilize the vital balance of the Great South Bay ecosystem, decreasing the amount of light that is needed for the growth of valued seagrasses. Also, brown tide phytoplankton impact the feeding and growth of hard clams. And as phytoplankton decompose, dissolved oxygen levels can decline, affecting the bay's marine animal communities.

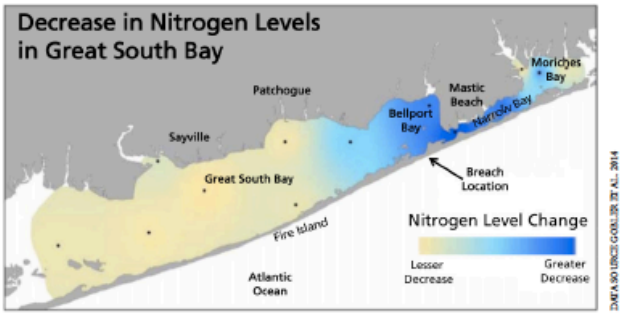
After the breach formed, harmful brown tides became less frequent and less intense in areas of eastern Great South Bay near the breach. This is largely a result of current water circulation patterns. The breach caused water, organisms, nutrients, pollutants, and other substances to spend less time in Great South Bay before being flushed out and replaced by new water flowing in from the ocean.

Phytoplankton in the bay are not always harmful. When blooms are not excessive, these marine plants serve as an important source of food for animals that live in the bay, such as hard clams, bay scallops, and other organisms.

These changes suggest that the breach had a positive influence on water quality in the vicinity of the breach, but brown tides simultaneously became more intense in areas of central Great South Bay. New water circulation patterns caused by the breach might play a role. However, because brown tides have been a regular occurrence in the bay for several decades, some uncertainty remains as to the breach's influence on the increasingly intense brown tides in central Great South Bay.

Nitrogen Pollution

Nitrogen pollution is one of the primary causes of poor water quality in Great South Bay, and it may also stimulate brown tide blooms. Nitrogen levels decreased in some areas since the wilderness breach formed, particularly in Bellport, Narrow, and western Moriches bays. However, because of the impacts of septic systems, urban development, and fertilizers on nitrogen levels, nitrogen pollution is likely to remain an issue regardless of the breach's effects on water quality.



This map compares data from 2000 and 2008 to data from 2013 to illustrate how nitrogen levels decreased across Great South Bay since the wilderness breach formed. Greater decreases, in blue, are likely the result of ocean water diluting nitrogen-rich bay waters.

Seagrass

As a result of breach-related water quality changes, seagrass in Great South Bay, including eelgrass and widgeongrass, increased in abundance in isolated clusters east of the wilderness breach and in areas west of the breach where it has been absent for more than a decade. Between the 1930s and 2003, Great South Bay lost an estimated 90 percent of its seagrass beds. The decline of eelgrass was a matter of special concern because it is the most ecologically valuable submerged aquatic vegetation in the bay, providing habitat for small fish, crustaceans, and the economically important bay scallop. The wilderness breach caused cooler summer water temperatures in close proximity to the breach, as well as improved water clarity and higher salinity, all of which are beneficial for eelgrass.

Hard Clams

Hard clams thrive in habitats with high-quality food sources, so they showed improved growth rates in areas near the breach. As brown tides became less frequent and less intense near the wilderness breach, larger forms of phytoplankton, which are a high-quality food source for hard clams, started to take the place of smaller phytoplankton. It is unclear how they will respond over the long term, as other changes could adversely affect hard clam populations. For example, low density of hard clams in Great South Bay may limit the success of this species during spawning. Water temperatures near the breach might become too cold for hard clam growth. Also, increased salinity in some areas of Great South Bay could encourage the growth of the hard clam parasite QPX (Quahog Parasite Unknown). Likewise, there may be increased predation of hard clams by lady crabs, which became more abundant in the area since the breach.

Finfish, Crabs, and Shrimp

Finfish, crabs, and shrimp are affected by the influx of ocean water from the wilderness breach. Finfish such as bay anchovy, silverside, three-spine stickleback, killifish, and pipefish became more abundant near the breach and east of it. Alewives, which migrate from salt water to fresh water to spawn, increased in abundance as well. They may enter the bay through the breach to find spawning grounds in rivers along the Long Island south shore. Juvenile summer flounder and tropical fish species that favor higher salinities have also been found in eelgrass beds near the breach. The abundance of finfish following the formation of the breach is linked, in part, to the recovery of eelgrass beds, which provide crucial habitat and foraging and nursery grounds. Finfish also seem to be finding food sources, such as species of grass shrimp. After the breach formed, lady crabs, which prefer higher salinities, increased in numbers by 500 percent near the wilderness breach. In this part of the bay, blue crabs have declined by 80 percent in response to the salinity change. Scientists believe blue crabs prefer more brackish water and have migrated away from the breach.

We Want to Hear from You

The Draft Breach Management Plan/Environmental Impact Statement (EIS) will be released for a 45-day public review and comment period. Please submit your comments:

Online: parkplanning.nps.gov/FireIslandBreachManagementPlan

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Acquisition, Coordination, Compilation, Data Management and Change Analysis of LiDAR and Other Geospatial Data Collected Pre- and Post-Hurricane Sandy
Task Agreement P13AC00875 of Cooperative Agreement Number P09AC00212

Appendix II

Training Handouts and Worksheets for Park Interpretive Rangers

Building Blocks of Interpretive Programs

Theme: Every program has to have a theme. The theme should be clearly stated in a single sentence. The interpretive theme is a tool to help you organize your program because it will provide a focus. If information does not support your theme, consider leaving it out. (If the information really must be there, than perhaps you should select a different theme.) Good themes have a "wow" factor; something that will provoke the interest of your visitors. Program themes must tier from park-wide interpretive themes, which in turn are based on park significance.

- Animals and plants have many physical adaptations that help them meet their needs for food, protection, movement, and reproduction.
- Many different species of birds make this park their home, or migrate through, and they interact with the barrier island environment in many ways.
- The limitations of the musket dictated the method of warfare used by both Colonists and British Regulars.
- The creative energy fostered within a small group of Concord residents created an Intellectual Revolution.

Objectives: Objectives are measurable. They support the theme. A 20 minute talk should have 2 or 3 objectives; a longer program could have 3 or 4.

- During the program visitors will observe 3 bird behaviors in the wild.
- At the end of the program, participants will be able to list 3 values of salt marshes.
- During the program, participants will identify 3 minerals found in the sand on the ocean beach.
- At the end of the demonstration visitors will be able to list the 3 parts of a musket: lock, stock and barrel.
- At the end of the tour visitors will be able to list three authors who lived in the Wayside: Nathaniel Hawthorne, Louisa May Alcott, A. Bronson Alcott, and Harriet Lothrop.

Goal: The Goal is the purpose the program is being presented. "The goal of the program is for participants to gain a better understanding of shoreline dynamics processes and building sustainably on a barrier island." The goal of your program may actually be determined not by you, but by the Interpretive Themes of the park. The park-wide interpretive themes for Fire Island National Seashore are:

- **Nature's Rhythms of Change and Renewal**
  Fire Island is constantly changing and always on the move. The very existence of this barrier island and the plant and animal communities that it supports, as well as human engagement in this landscape is dependent upon Nature's rhythms of change and renewal.

- **Island Resources from Ocean to Bay**
  From the pounding surf of the ocean, to the swift flow of inlets, to the relative calm of the bay, this island encompasses a myriad of marine and upland environments that supports a diverse assemblage of species and provides opportunities for maritime recreation and livelihood.

- **Fire Island: A Story of People and Place**
  For centuries, people have been and will continue to be intertwined with this delicate environment; actions today will shape Fire Island and its surrounding into the future thus challenging all to become stewards of our natural and cultural legacy.

- **The Life and Times of a Patriot**
  As a signer of the Declaration of Independence, William Floyd, prominent New York political leader and wealthy plantation owner, provides a personal perspective on the risks to life, property, and reputation associated with being a patriot in New York during the War for Independence.

- **Three Centuries of Change at the Floyd Estate**
  The Floyd family's personal stories and 250-year occupation of the Floyd Estate in Mastic Beach provide a lens through which to understand the dynamic social, economic, and political changes that took place over that time on Long Island and throughout the nation.

Tangible: These are the physical things we use in our programs that can be seen and **touched**. They are the shells, historic weapons, the Fire Island Lighthouse, a compass, dune, a marsh, Old Mastic House, the Great South Bay, the Fresnel Lens.

Intangible: This is the meaning of the tangible object. Why should the visitor care about the object? What does the object represent or symbolize? Many objects have the ability to represent more than one intangible, make sure you pick the one that supports your theme.

- A shell can represent home, shelter or protection.
- A lighthouse can represent a guiding light that will warn you about danger or guide you to a safe harbor
- Historic weapons can represent: war, the struggle for independence, death, and to some safety, liberty or freedom.
- The marsh or the dune can represent living on the edge, a hard life; it can also represent cycles of change, an abundance of beauty, a habitat and home and the nurturing of life.
- The Old North Bridge can be a powerful metaphor. Like the musket it can represent the war & the struggles for independence. But bridges can get you safely over trouble, and they also connect. They can connect the present to the past; they allow you t cross over from diplomacy to armed conflict or from ideology to action.
- The desk and the pen can represent: that which is mightier than the sword, an expression of creative thought, or a way to earn a living. Words that are written down by one generation and read by another generation can transmit values beyond the writers' immediate circle of influence. Ex. Gandhi read Thoreau, and Dr. Martin Luther King read Gandhi. All three men used nonviolent civil disobedience tactics.

Universal Concept: The most powerful intangible concepts have universal appeal and meaning. However, they most likely mean something different to each visitor. Consider how the universal concept of "Family Values" has created so much conversation and difference of opinion. Effective use of universal concepts will allow your visitors to make personal connections and foster a lasting memory of their visit.

- Home
- Life
- Danger
- Protection
- Death
- Creative Expression

Sense of Place: Show the visitors what is special about this specific place. Visitors come to our park from all over the country and all over the world. We are obligated to connect the visitors' experience to the park resources. If what you are saying can be said anywhere else, then you are not connecting to your resource. The visitor should not have a redundant experience. The talk you give at one section of the park should be different from the talk you give at another part of your park. Your talks should not summarize an introductory video or a park brochure (the visitors already got that information). Like a good trilogy, each talk or tour should stand alone in its plot and content but still connect to the continuous story line.

What Is Facilitated Dialogue?

"Facilitated Dialogue" is a form of interpretive facilitation that uses a strategically designed set of questions – an "arc of dialogue" -- to guide participants into a structured, meaningful, audience-centered conversation about a challenging or controversial topic.

There are several components that make Facilitated Dialogue successful:

- **An Interpretive Experience** – What interpretive experience can I integrate that will give everyone the opportunity to connect, in their own way, to the meanings of the site or topic? This experience will become the springboard for the dialogue. This can be anything interpretive (a talk, walk, tour, exhibit, film, demonstration, activity, etc)

- **Dialogue Introduction** consists of a welcome to the participants and the following:
  - The interpretive purpose—what we will explore together
  - The dialogic purpose – why we're using dialogue as our approach
  - Group Guidelines/Agreements – What are the group agreements or guidelines that will keep participants safe and encourage constructive exchange?

- **Arc of Dialogue (Phased Questions)** – Phase 1 (Community Building); Phase 2 (Sharing Our Experiences); Phase 3 (Exploring Beyond our Experiences); and Phase 4 (Synthesizing and Bringing Closure to the Dialogue) – What questions can you ask for each phase based on the resource, audience, location, etc…?

- **Dialogue Conclusion** – At the end of Phase 4, the facilitator pulls the threads together from the shared experience, and synthesizes the meanings that emerged from the dialogue; thanks the participants and officially concludes the experience

- **Dialogue Techniques** – What techniques will complement the questions in each Phase of the dialogue by enhancing personal and group exploration of the topic?

Examples of Techniques to Foster Dialogue

- **Popcorn** - capturing participants spontaneous thoughts and writing them down for everyone to see
- **Gallery Walk** - Participants read over several quotes or statements that are posted throughout the room. Give participants time to read each one; then invite participants to stand by the quote/statement that most moved or struck them in some way ("they want to talk more about the quote/statement.") Then ask participants to respond to a specific question.
- **Graffiti Wall** - allow participants to illustrate their response/reaction to a question, statement, or quote rather than describe in words. Allow time for participants to review the graffiti wall.
- **Chalk talk** - People react/respond (either by writing directly on whiteboard or sticky note) to a question/statement and then participants read the responses either individually or in groups.
- **Fish Bowl** - arrange chairs in two circles (inner and outer), have participants in one of the circles respond/react to question, statement, quote, etc… while the other circle (group) listens. Swap groups to give the silent group of listeners the same opportunity.
- **Pair Share** - two participants react/respond to a question, statement, quote, etc...

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- **Small Groups (or Cooperative Learning Groups)** - more than two participants reacting/responding to a question, statement, quote, etc...
- **Your "two cents"**- participants are given two pennies during the discussion they are only allowed two opportunities to share in the discussion. Once they have used their two pennies they must listen to others in the group.
- **Carpet of Ideas** - participants react/respond to a question, statement, quote, etc… on a large size index card. Once participants complete their response they share them on the "carpet" or floor in a designated area … the facilitator leads a discussion based on the responses from the cards and/or allows participants to react to the responses.
- **Footprints** - Allow participants to walk or choose to walk through the footprints of a specific group based on specific questions or a shared experience.
- **Ballot Box** - Allow participants to vote on a controversial topic and engage participants in a conversation about the results.
- **Film series** - Invite participants to engage in a longer dialogic process (several films on the same topic but from different points of view)
- **E-dialogue** - Conduct a blog w/ participants or a virtual book club using the ARC of Dialogue model.
- **Hands-off Facilitation**- facilitator completely steps back and allows the conversation to flow fluidly, maintaining a safe space.
- **Caucusing** - Allow visitors to be active participants (i.e. How do you identify? In groups, work together to...What are the challenges and how do people see you? How do you see yourself?) by identifying with their respective group (race, culture, religion, neighborhood, etc…) to explore difficult issues within the safety of the "identity group."
- **Serial Testimony** - Participants get to react and share without interruption or questions from the other group members. This might be timed.
- **Anonymous Testimony** - Participants react/respond to a questions, statement, quote, etc and anonymously submit their answer on large index card, the cards are posted and conversation occurs around the responses to the questions rather than on the person who made the comment.
- **Photolanguage** - examination of photos; participants review the photo collection (without choosing a photograph); after review participants are given the opportunity to go to the photo that resonates with them. Allow participants to share why the photograph is important. (I.e. choose a photograph that represents immigration as you understand it).
- **Mutual Invitation** - In small groups, one participant invites the other person to share (i.e. What troubles you most about our collective response to current immigration? What do you find most reassuring?) Give groups enough time to respond.
- **Dialogue w/ mobile device** - allow participants to respond to specific questions anonymously. (e.g. Using Socrative, a smart response system (http://www.socrative.com/), allows for anonymity but gives participants an opportunity to see and respond to responses as they are given.
- **Wagon Wheel or Concentric Circles**- divide the entire group into two groups of equal number. The first group is asked to arrange chairs—one person to person—in a circle facing out. The second group then arranges around the inner circle and with their chairs facing in. The result is two concentric circles with chairs that face one another to form pairs. After a question is posed give a specific time to respond. At the end of the time, the pairs stand up and each person moves one seat to his or her right. In effect, the two concentric wheels are moving in clockwise and counterclockwise directions to create new pair groupings.
- **Vote with Your Feet** – post two or more statements on the wall and ask participants to stand by the one they most agree with; this provides a visual quantification of the group's perspectives, and allows for discussion about multiple perspectives

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Interpretive Development Program

Dialogue Worksheet

Dialogue Foundation

Site Significance

- What unique, site-specific value, issue or topic could be meaningfully explored through dialogue?

_____

Audience

- What audiences might be effectively served by exploring that value, issue or topic through dialogue?

_____

Relevance

- What meanings would be relevant to your audience related to this issue/topic/value?

_____

Goals

- What are your intended outcomes of the dialogue for…
  - your audience? _____
  - your site (management goals/NPS mission) _____
  - addressing the needs of society/civic skills? _____

Essential question/theme question

- What is the relevant, issue-based question that the dialogue will address?

_____

Shared Experience

- What program, experience or resource could work as a shared experience for the dialogue?

_____

- How might you transition from that shared experience to the dialogue moments?

_____

Adapted from the International Coalition of Sites of Conscience "Designing the Arc of Dialogue" Worksheet

Dialogue Design

Crafting Safe Spaces

- How do you plan to offer your audience a safe place (both physically and psychologically) to consider the dialogue's questions?

_____

Dialogue Questions – Brainstorm a few possible questions for each phase of the arc.
When building questions, remember…

- To keep the questions open-ended; there shouldn't be a "right" answer.
- To ask questions visitors can answer from personal experience alone.
- The goal of a good question is to provoke thought and discussion, not instruct.
- Questions with the words "you" and/or "we" in them often work the best.

Phase 1: Community Building and Ice-Breaker Help build the "learning community" and break down artificial barriers between people by providing participants with non-threatening opportunities to share about themselves and begin to learn about others.	• • Technique:
Phase 2: Sharing the Diversity of Experiences Invite participants to think about their own experiences with the dialogue topic and to bring examples of these experiences into the conversation. Allow participants to begin to establish a "common ground" of understanding and personal connection to the dialogue topic.	• • Technique:
Phase 3: Exploring Diversity of Experiences Beyond Our Personal Experiences Explore the dialogue topic beyond participants' personal experiences. Help participants to engage in inquiry and exploration about the dialogue topic in an effort to learn with and from one another.	• • Technique:
Phase 4: Synthesizing the Experience Helps participants to identify and make meaning from the "threads" that connect the ideas, perspectives and insights generated through the dialogue. Work with the group to reflect on what, if any, are the next steps the visitor can take.	• • Technique:

Adapted from the International Coalition of Sites of Conscience "Designing the Arc of Dialogue" Worksheet

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